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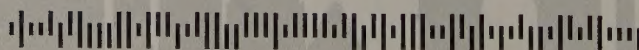
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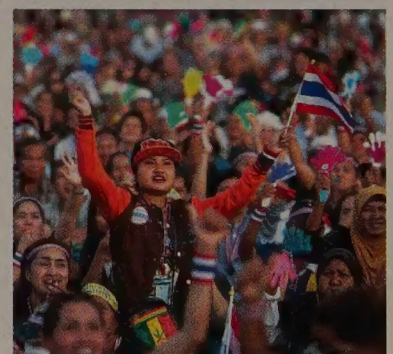
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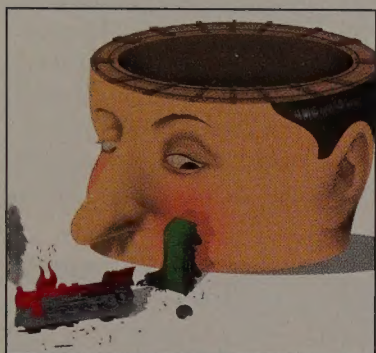


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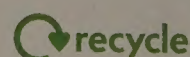
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Politics



The five permanent members of the UN Security Council plus Germany agreed to an interim deal with **Iran** that would require it to keep its uranium enrichment to no more than 5%; to convert or dilute its stocks of near-20% enriched uranium (stuff that would get Iran closer to weapons-grade material); to halt most construction at a planned heavy-water reactor; and to allow for intrusive inspections. Hawks in **America's** Congress, **Israel**, **Saudi Arabia** and some other Gulf states decried the deal. Hardliners in Iran said it gave too much away. Other Western governments said it was the least bad option and should be given a chance—by being tested over the agreed six-month period.

The UN secretary-general, Ban Ki-moon, announced that **Syria's** government and representatives of the opposition would meet in Geneva on January 22nd to try to negotiate an end to Syria's civil war. The United States, Russia, France, Britain and Turkey are also expected to attend.

Egypt's interim president, Adli Mansour, enacted a law that would enable the authorities to curtail street protests.

The UN led international calls for intervention in the **Central African Republic** to prevent a humanitarian crisis from spiralling out of control. Rebel forces who seized the country in March are spreading mayhem across the country. **France** said it would increase its deployment of troops from 400 to 1,200 to guard the airport near the capital, Bangui,

and to keep open the main road to neighbouring **Cameroon**, which provides a vital outlet for the landlocked CAR.

A left-right alliance

Germany's chancellor, Angela Merkel, announced a "grand coalition" government between her Christian Democratic Union and the centre-left Social Democratic Party. Negotiations began after the federal election in September. Terms of the deal include a national minimum wage from 2015 and opposition to any mutualisation of euro-zone debt. Ms Merkel said the coalition would stand for "solid finances, secure prosperity and social security".



Tens of thousands of **Ukrainians** took to the streets of Kiev, clashing with police who used tear gas, to protest against their government's last-minute decision to suspend talks with the EU about forming closer ties. The Ukrainian government's decision was in response to Russian pressure, as well as to the EU's demand that Ukraine release Yulia Tymoshenko, a former prime minister, from prison for medical treatment, which President Viktor Yanukovich, her arch-rival, is unwilling to do.

Latvia's government resigned over the collapse of a super-market in Riga, the capital, that killed at least 54 people.

The Italian Senate expelled **Silvio Berlusconi** over his conviction for tax fraud. He could now face arrest in other criminal cases. The 77-year-old former prime minister is likely to serve a one-year prison sentence under house arrest because of his age, but he has vowed to continue to lead his

Forza Italia party, which still enjoys significant electoral support.

Scotland's nationalists unveiled their blueprint for independence from the United Kingdom, which will be voted on next year. The document left many questions unanswered, such as whether Scotland would keep the pound.

China overreaches

China announced that it was setting up a new "air defence identification zone" over the East China Sea, which covers the airspace above islands controlled by **Japan** but claimed by China. China's move prompted America to fly two B-52 bombers over the area in defiance of the new rules that all planes must provide prior notification. **South Korea** and Japan said they, too, flew military aircraft over the zone.

Meanwhile, China said it would land a probe on the **moon** in December.

Protesters in **Thailand** forced the evacuation of the building housing the country's crime-fighting agency and occupied the finance ministry. The protesters' aim is to topple the government, which they say is being controlled by Thaksin Shinawatra, a former prime minister who lives in exile.

Pakistan appointed a new head of the army. Lieutenant-General Raheel Sharif, a career infantry soldier, is unrelated to the prime minister, Nawaz Sharif, but Mr Sharif will have carefully considered the appointment of the general, given his confrontations with the army during previous terms in office.

All talked out

Frustrated by Republican intransigence over approving Barack Obama's judicial nominees, the Democratic leadership in the Senate forced through a far-reaching reform of the rules on **filibustering**. From now on, a simple majority of senators will be able to end a filibuster of a presi-

dential nominee for executive and judicial positions, except to the Supreme Court.

The Obama administration proposed new rules for **campaign spending** by groups that are exempt from tax and therefore do not have to reveal their donors. Spending by such groups on the left as well as the right has soared since 2008. Earlier this year it emerged that the tax authorities were investigating the tax-exempt status of the Tea Party.

The law-and-order election



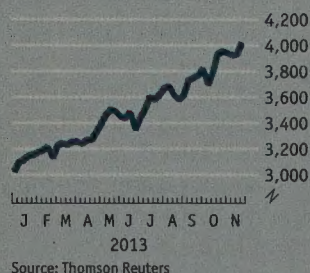
With 80% of the vote tallied, Juan Orlando Hernández, a conservative, appeared to have won a presidential election in **Honduras**, Latin America's most violent country. But Xiomara Castro, the wife of Manuel Zelaya, a former president ousted in a coup, refused to concede.

A senior aide to Henrique Capriles, **Venezuela's** opposition leader, was dragged from his hotel, beaten and detained for several hours by military intelligence officers. This forms part of a pattern of official harassment of the opposition ahead of municipal elections on December 8th that many see as a plebiscite on the increasingly authoritarian rule of Nicolás Maduro.

After several false starts in its effort to attract private investment into infrastructure, **Brazil's** government held successful auctions of contracts to upgrade and operate two of the country's main airports and an important highway. Less happily, two workers were killed when a crane collapsed at a stadium being built in São Paulo for next year's football World Cup. ►►

Business

NASDAQ Composite Index



The **NASDAQ Composite Index** closed above 4,000 for the first time in 13 years. The NASDAQ had lagged other stockmarkets, though it has now risen by 34% so far this year; the S&P 500 has advanced by 27% and the Dow Jones Industrial Average by 23% (though the Dow and S&P 500 have both frequently set record-breaking highs in that time). Tech companies have helped push up the NASDAQ; Netflix's share price has increased by 292% this year and Facebook's by 74%.

The **Nikkei 225** stock index in Tokyo hit its highest point since mid-December 2007, helped by a declining yen that boosts Japanese exports.

Brazil's central bank raised its main interest rate for the sixth time in a row, to 10%, amid worries about inflation and a high budget deficit.

Tavares is a hit

PSA Peugeot Citroën named a successor to Philippe Varin as chief executive: Carlos Tavares, who until this summer was in charge of operations at the carmaker's arch-rival, Renault. A public outcry prompted Mr Varin to renounce a pension pot worth €21m (\$29m). Peugeot is undergoing a deep restructuring, with many job losses, and has tapped €7 billion in state guarantees.

Fiat said that launching an IPO of **Chrysler**, in which it owns a 58.5% stake, would be impracticable before the end of the year, reversing its assertion that a flotation was on track for 2013. The IPO has been requested by the union health-

care trust fund that holds the remaining 41.5% stake. Fiat wants to buy that stake and integrate fully with Chrysler, but the two sides disagree about the price.

South Korea's ministry of defence revamped the specifications for new **stealth fighters** it is ordering, which in effect awards the contract to Lockheed Martin's F-35A. During the summer Boeing's F-15 fighter jet was thought to have wrapped up the bid. When completed it will be South Korea's costliest acquisition of weapons to date; neighbouring China and Japan are also upgrading their fleets of stealth aircraft.

Investors responded positively to **Hewlett-Packard's** quarterly earnings after it reported a \$1.4 billion net profit and just a small dip in revenue and compensated for weakness in China by doing well in other emerging markets. Meg Whitman, HP's boss, also said that it had not been hurt by the revelations of online snooping by America's National Security Agency. Cisco recently warned that the spying revelations had prompted a "level of uncertainty" among foreign buyers of its network equipment that will affect its sales.

John Chen, **BlackBerry's** acting chief executive, streamlined the company's senior ranks by getting rid of the chief marketing and operating officers. (Both had been appointed by Thorsten Heins, who was recently booted out as chief executive.) He also replaced the chief financial officer and reduced the board by one member to seven.

Speculation mounted that a mega-takeover bid is in the offing for **Time Warner Cable**, America's second-biggest provider of cable television. The rumoured bidders include Comcast, Cox Communications and Charter Communications, in which John Malone is the biggest investor.

A big blow

RWE, a German energy company, ditched a project to build the world's biggest offshore windpower array off the south-west coast of Britain, because of development costs that are "prohibitive in current market conditions". Critics of the British government's apparent change of heart over renewable energy (David Cameron has reportedly told advisers to "get rid of the green crap") say it has created uncertainty among investors in such projects.

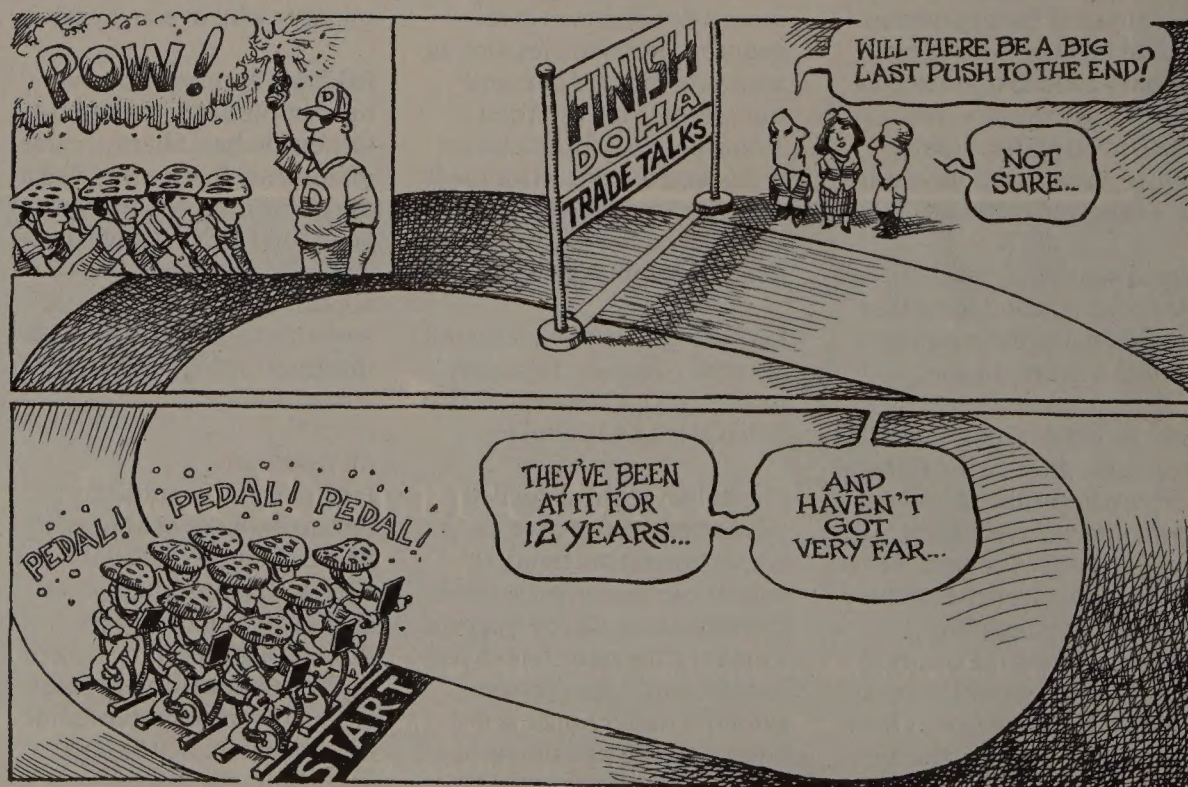
Repsol, Spain's biggest oil-and-gas company, agreed to pursue talks with the Argentine government over its offer of compensation, said to be worth \$5 billion in dollar-denominated bonds, for nationalising **YPF**, Repsol's subsidiary in Argentina. The expropriation has frayed relations between Argentina and Spain, which will want a guarantee from Argentina that it will honour its bond.

The Irish government abandoned a partial sale of the state gas company because the submitted bids were too low. The sale was fundamental to **Ireland's** agreement with the EU and IMF to divest national assets to raise €3 billion (\$4.1 billion). The country is still expected to finish its bail-out programme in December.

The shoe is on the other foot

After rejecting a takeover bid from **Jos A. Bank**, **Men's Wearhouse** submitted a reverse takeover offer for its smaller rival. With both American clothing chains obviously suited for a merger, the only question seems to be how much they are willing to pay to tie it up.

Other economic data and news can be found on pages 88-89



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Unlocking the Middle East

Not only was the deal with Iran the best on offer, but it can transform the world's most troubled region



FOR over three decades Iran and America have been blood enemies. Their hatred, like the hatred between the Palestinians and the Israelis, has framed the Middle East's alliances and fuelled terror and war. The interim deal over Iran's nuclear programme has not undone that—far from it. But through the keyhole it offers a tantalising glimpse of a different, better Middle East. It is a vision worth striving for.

Iran and six world powers, led by America, struck the six-month interim nuclear agreement in the early hours of November 24th (see page 23). Iran will cap its programme at more or less its capacity today, while the rest of the world will relax sanctions a little. But the deal matters mostly for what it heralds. If Iran shows restraint and the world rewards it, the negotiators might generate sufficient goodwill to reach a more durable and comprehensive agreement. And that would open up the possibility of America and Iran co-operating more, or at least feuding less, in the world's most troubled region.

Bolts, but not nuts

Pure fantasy, say the Gulf Arab states and Israel (and its allies in Congress). Invoking Neville Chamberlain in Munich in 1938, they warn that the world is appeasing an aggressive and malign regime bent on a nuclear arsenal. During years of talks, Iran has earned a reputation for double-dealing. It is a sponsor of terror, Bashar Assad's main backer in Syria and a mortal threat to Israel. The regime foments hatred of the Great Satan in Washington not by chance, but to justify its hold on power.

The deal is thus a lousy one, argues Israel's hawkish prime minister, Binyamin Netanyahu, because Iran will never honour it or negotiate a final agreement. America has rewarded a wicked regime at the expense of its allies. A tough line—sanctions and talk of an Israeli attack—brought Iran to the table; only a tougher one will get it to give up its programme.

This newspaper sees it differently—in terms of both the risks and the rewards. Doing anything with Iran is a gamble, but in the short term there is not much for the West to lose. The big face-saving concession for Iran is that the regime is still permitted to continue enriching uranium. But the enrichment will be only to the 5% civilian level, and Iran has agreed to daily inspections of its nuclear facilities, to monitoring by cameras and to opening up more of its sites. If the regime makes a dash for a bomb, the world can find out soon enough to take action. If the talks break down, Iran will not be much closer to having a bomb than it is today—and further away than it would have been without a deal.

And the pressure is still on the regime. If Iran cheats or cynically sabotages further talks, it will embarrass Russia and China, which have staked their credibility on the agreement; they might back more sanctions. Barack Obama has rightly retained the threat of military action if Iran goes back on its pledge not to acquire a bomb. By contrast there is much to gain from sticking to the deal and going further—not least for Iran it-

self. Although it has already won about \$7 billion of sanctions relief, the remaining oil sanctions alone will cost it about \$30 billion in the next six months, a big incentive to move on to a bigger deal.

Whether it chooses to depends on Iran's willingness to put its past as a pariah state behind it. It is here that the really big rewards begin. If ever there was a moment to test the idea that Iran is ready to change, it is now. The president, Hassan Rohani, was elected this summer on a wave of popular discontent towards the conservative establishment and the hardline policies of his predecessor, Mahmoud Ahmadinejad. Young Iranians are disenchanted. The supreme leader, though a sworn enemy of America, has given Mr Rohani licence to talk to the West. Were Mr Rohani to conclude that the regime had more to gain from being part of the world rather than wholly against it, that would be a prize in itself. But even larger rewards would come if a less isolated Iran became more reasonable, too.

Small chance, great prize

Iran is a country 77m-strong with a rich imperial history: it is also the most important Shia Muslim power. If it changes its outlook, the whole of the Middle East will change with it. Imagine that Iran one day concluded that spreading mayhem ultimately tends to create trouble at home and began to view its neighbours in terms of opportunities rather than threats. That would do more for the security of Israel and Saudi Arabia than any number of weapons agreements.

The immediate test, and opportunity, will be Syria. Without Iran, Mr Assad would have been ousted long ago. Now Iran is losing men and money there. It also shares, with America, a fear of the Sunni extremism flourishing in rebel-held areas. The West needs to accept that Iran must be at the table in the peace talks due in Geneva. If anybody can bully Mr Assad to offer concessions, it is Mr Rohani. And if Syria becomes even mildly more tranquil, it would calm its neighbours.

In Lebanon, suppose that Iran ceases using Hizbullah, its proxy, as a constant threat to the country's stability and to Israel. Or that Iran started to use its influence over the Shia population in Iraq to broker peace, rather than to sow discord. Even if Iran merely started to be less mischievous in Iraq (or for that matter in Bahrain, Palestine and Yemen), the Middle East would become a more stable place. All this would take time—after 34 years America and Iran have a lot of catching up to do. But it is worth remembering that they were once allies.

Saudi Arabia and Israel are at once troubled by the prospect of a redeemed Iran and also convinced that the whole idea is a dangerous illusion. Yet the real fantasy is to imagine that more sanctions or harsher negotiations could have produced a deal that was much better than this one. The alternative was not for Iran to abandon its nuclear programme, but for America to abandon diplomacy—and prepare for an assault.

Bombing would probably set Iran back by only a few years; but it would certainly remake the Middle East in a very different way. Nobody knows whether the gamble with Iran will pay off. But it is already clear that the risks are low, the prize is potentially vast—and the alternative is dire. ■

China, Japan and America

Face-off

China's new air-defence zone suggests a worrying new approach in the region



THE announcement by a Chinese military spokesman on November 23rd sounded bureaucratic: any aircraft flying through the newly designated Air Defence Identification Zone (ADIZ) in the East China Sea must notify Chinese authorities

in advance and follow instructions from its air-traffic controllers. America's response was rapid. On November 26th Barack Obama sent two B-52 bombers to fly through the new zone without notifying China (see page 39). This face-off marks the most worrying strategic escalation between the two countries since 1996, when China's then president, Jiang Zemin, ordered a number of exclusion zones for missile tests in the Taiwan Strait, leading America to send two aircraft-carriers there.

Plenty of countries establish zones in which they require aircraft to identify themselves, but they tend not to be over other countries' territory. The Chinese ADIZ overlaps with Japan's own air-defence zone (see map). It also includes some specks of rock that Japan administers and calls the Senkaku islands (and which China claims and calls the Diaoyus), as well as a South Korean reef, known as Ieodo. The move is clearly designed to bolster China's claims (see page 44). On November 28th Japan and South Korea sent aircraft into the zone.

Teenage testosterone

Growing economic power is bound to go hand-in-hand with growing regional assertiveness. That is fine, so long as the behaviour of the rising power remains within international norms. In this case, however, China's does not; and America, which has guaranteed free navigation of the seas and skies of East Asia for 60 years, is right to make that clear.

How worrying China's move is depends partly on the thinking behind it. It may be that, like a teenager on a growth spurt who doesn't know his own strength, China has underestimated the impact of its actions. The claim that America's bombers had skirted the edge of the ADIZ was gawkily embarrassing. But teenagers who do not realise the consequences of their actions often cause trouble: China has set up a *casus belli* with its neighbours and America for generations to come.

It would thus be much more worrying if the provocation was deliberate. The "Chinese dream" of Xi Jinping, the new president, is a mixture of economic reform and strident nationalism. The announcement of the ADIZ came shortly after a party plenum at which Mr Xi announced a string of commendably radical domestic reforms. The new zone will appeal to the nationalist camp, which wields huge power, particularly in the armed forces. It also helps defend Mr Xi against any suggestions that he is a westernising liberal.

If this is Mr Xi's game, it is a dangerous one. East Asia has never before had a strong China and a strong Japan at the same time. China dominated the region from the mists of history until the 1850s, when the West's arrival spurred Japan to modernise while China tried to resist the foreigners' influence. China is eager to re-establish dominance over the region. Bit-

terness at the memory of the barbaric Japanese occupation in the second world war sharpens this desire. It is this possibility of a clash between a rising and an established power that lies behind the oft-used parallel between contemporary East Asia and early 20th-century Europe, in which the Senkakus play the role of Sarajevo.

Seas of troubles

Tensions are not at that level. Japan's constitution bans it from any military aggression and China normally goes to great lengths to stress that its rise—unlike that of Japan in the 1920s and 1930s—will be peaceful. But the neighbours are nervous, especially as the establishment of the ADIZ appears to match Chinese ambitions in the South China Sea.

Chinese maps show what is known as the "nine-dash line" encompassing all the South China Sea. In the wake of the global financial crisis, perhaps believing its own narrative of Chinese rise and American decline, it began to overreach in its dealings with its neighbours. It sent ships to disputed reefs, pressed foreign oil companies to halt exploration and harassed American and Vietnamese naval vessels in the South China Sea. These actions brought a swift rebuke from America's then secretary of state, Hillary Clinton, and China appeared to back off and return to its regional charm offensive. Some observers say that the government is using the ADIZ to establish a nine-dash line covering the East China Sea as well. They fear China's next move will be to declare an ADIZ over the South China Sea, to assert control over both the sea and the air throughout the region.

Whether or not China has such specific ambitions, the ADIZ clearly suggests that China does not accept the status quo in the region and wants to change it. Any Chinese leader now has an excuse for going after Japanese planes. Chinese ships are already ignoring Japanese demands not to enter the waters surrounding the disputed islands.

What can be done? Next week Joe Biden, America's vice-president, arrives in China. The timing may be uncomfortable, but it is fortuitous. Mr Biden and Mr Xi know each other well: before Mr Xi became president, he spent five days in America at Mr Biden's invitation. Mr Biden is also going to South Korea and Japan.

America's "pivot" towards Asia is not taken very seriously there: Mr Obama is seen as distracted by his domestic problems. Mr Biden could usefully make clear America's commitment to guaranteeing freedom of navigation in the region. Japan and South Korea, who squabble over petty issues, need to be told to get over their differences. As for China, it needs to behave like a responsible world power, not a troublemaker willing to sacrifice 60 years of peace in north-east Asia to score some points by grabbing a few windswept rocks. It should accept Japan's suggestion of a military hotline, similar to the one that is already established between Beijing and Washington.

The region must work harder to build some kind of architecture where regional powers can discuss security. If such a framework had existed in Europe in 1914, things might have turned out differently. ■

Digital money

The Bitcoin bubble

It looks overvalued. But even if this digital currency crashes, others will follow



BITCOIN is booming. Investors are piling into the digital currency, which is not issued by a central bank but is conjured into being by cryptographic software running on a network of volunteers' computers. This week the price of a Bitcoin

soared to above \$1,000, from less than \$15 in January.

Having long been favoured by libertarians, gold bugs and drug dealers, Bitcoin is attracting some surprising new fans. Germany has recognised it as a "unit of account". Ben Bernanke, chairman of the Federal Reserve, told a Senate committee on virtual currencies that the idea "may hold long-term promise". A small but growing band of shops and firms accept payments in Bitcoin. Some like the way it allows funds to be transferred directly between users, without middlemen. Others are attracted by the potential for anonymous transfers, or by the fact that the number of Bitcoins in circulation has a fixed upper limit—so there is no way a central bank can inflate their value away by issuing more.

But the recent price surge, driven by Chinese investors stashing money offshore, looks like a classic bubble. Hoarding means that Bitcoin is currently more of a speculative asset than a currency. And a crash is not the only risk Bitcoin users face. As the price rises, Bitcoin theft is increasing, both from individuals and from online exchanges that store the coins and convert them into other currencies. Around \$1m in Bitcoins was recently stolen from BIPS, a European exchange. GBL, a Chinese Bitcoin exchange, abruptly vanished in October, taking \$4.1m-worth of deposits with it.

The system itself is straining at the seams (see *Technology Quarterly*). The amount of computing power consumed by its transaction-verification system, which has the side-effect of

"mining" new Bitcoins, is mushrooming: it now far exceeds that of the world's 500 fastest supercomputers combined. At the same time Bitcoin's method of recording and processing transactions, and compensating those who verify them, is becoming unwieldy. Adjusting Bitcoin's protocols, however, requires getting the volunteers who maintain its software to agree on the necessary changes, and the Bitcoin community to adopt them, before anything goes wrong.

Excitement about Bitcoin, and concerns about its limitations, have prompted the emergence of many other cryptocurrencies, or altcoins. Litecoin, for example, retains Bitcoin's limited money supply but offers faster transactions and tries to avoid energy-intensive mining. And whereas Bitcoin was created by a mysterious figure known as Satoshi Nakamoto, who vanished in 2010, Litecoin's creator, Charles Lee, makes no secret of his identity. Peercoin has no money-supply limit and built-in inflation of 1%, though, as with Bitcoin, its creator is unknown. Anoncoin and Zerocoin, meanwhile, strive for complete anonymity—which Bitcoin lacks. And so on.

We've heard this song before

Bitcoin, then, is merely the first and, for the time being, the best-known example in a new category. In many ways it is akin to Napster, the pioneering file-sharing service that upended the music industry in 1999 by allowing internet users to call up almost any song at will. Though Napster, unlike Bitcoin, was illegal, it demonstrated that there was enormous demand for what it provided, prompting many other services to spring up in its wake. Just as Napster paved the way for BitTorrent, iTunes and Spotify, Bitcoin has triggered a surge of innovation in digital money.

So let a thousand altcoins bloom. In the meantime, if you are lucky or clever enough to have owned an asset whose price has risen 60-fold in a year, it might be time to sell. ■

Ukraine and the European Union

Day of the gangster pygmy

Why, despite the appearance of defeat, Europe might have won the battle of Ukraine



HISTORY, as every schoolboy knows, is often shaped by the courage, zeal and evil of titanic leaders. Less famously, it is sometimes swayed by the venality and self-interest of pygmies. That is frequently the case in the countries of the former Soviet Union, and seemed this week to be the tawdry fate of Ukraine. Viktor Yanukovich, its president, decided against signing a trade deal with the European Union. In the process he appeared to hand victory to Vladimir Putin in a struggle with the EU over Ukraine's geopolitical orientation. Yet for all

the dismay he caused, this might prove a better outcome than it looks—if the Europeans stick to their guns.

"I want to live in Europe", proclaimed some of the placards waved in Kiev this week. By many historical measures, Ukrainians already do: parts of their country once belonged to Poland and Austria-Hungary. Mr Yanukovich nevertheless turned his back on the agreement he was due to sign at a summit in Vilnius (see page 53). Facing an election in 2015, and desperate for cash to prop up an economy he has helped to ruin, he looked instead to Russia, which he hopes will offer cheap gas and loans with few conditions and little awkward oversight. He may (or may not) join a rival customs union that Mr Putin is pushing. The terms of Russia's offer are murky—and ►►

► Mr Yanukovich is now trying to placate the EU—but however he dresses it up, this was plainly a choice made more in his own interests than in his country's.

His slipperiness is, ironically, one reason not to be too downbeat. Had he signed the EU deal, Mr Yanukovich would probably have reneged on its terms, at the same time using the union's imprimatur as evidence of his respectability. Moreover the EU has—just—emerged from this squabble without seriously compromising its attachment to the rule of law and human rights. Having unwisely been drawn into a tug-of-war with Russia, it was tempted, for example, to ditch its demand for the release of Yulia Tymoshenko, the opponent whom Mr Yanukovich has imprisoned. Doing so would have suggested to both current and aspirant members of the EU that its talk of rules and democracy was so much cant.

To those who wait

The other reason to be upbeat is the reaction of Ukrainians. Tens of thousands went onto the freezing streets in protest—an uncomfortable reminder, for Mr Yanukovich, of the orange revolution of 2004, itself provoked by a bid to rig a presidential vote in his favour. Back then, Ukrainians were demonstrating for clean government and fair elections. Most have since concluded that integrating with the EU is their best hope of achieving them. (Note to Mr Putin: few people freely demonstrate for sleazy authoritarianism.)

It is far better for the EU that the backlash against Mr Yanukovich comes from the streets of Kiev rather than from Brussels. But the Europeans can still help. To begin with, they

should threaten and enact severe penalties if he uses force against protesters (as his side might have done in 2004, had outsiders not intervened). Travel bans and frozen bank accounts have proved effective weapons against post-Soviet kleptocrats. If he attempts yet another east-west auction of his country, the Europeans should be firmer in their principles: offering inducements only increases his leverage with Mr Putin. They must remember that, in their values and reputation, they have more at stake than Mr Putin ever could.

The sad reality is that Ukraine's politics are too dysfunctional to expect much European integration soon. Mr Yanukovich—whose rap-sheet features cronyism and claims of media harassment, alongside election-rigging and the selective incarceration of his enemies—has lost his chance to swap a gangster's reputation for a statesman's. He has probably made his cherished re-election, less rather than more, likely. But he is not the whole problem. Ukraine's current generation of leaders rose to power in its first, cut-throat decade of independence, and seem to regard government jobs and policies as assets to be milked. And the milkers include Ms Tymoshenko's orange revolutionaries, whose hypocrisy, greed and back-stabbing brought Mr Yanukovich to power.

The demonstrators in Kiev trust none of them and have no real leaders. Until new ones emerge, the West should concentrate on the Ukrainian people. That means kinder visa arrangements, more exchange visits for Ukrainian students, support for pro-democracy groups and election-monitoring. The EU must show the protesters that their feelings are reciprocated, even if their rulers are too myopic to share them. ■

Germany

Die grosse Stagnation

Germany's proposed new government is set to turn the motor of Europe into a slowcoach



LOOKING in from the outside, Germany seems to be a fearsome machine. Its super-efficient economy has not only weathered the euro crisis, but it has also paid for much of the emergency repair-work that has prevented the collapse of such countries as Greece, Portugal and Ireland. Its exports have flooded markets across the world. Its chancellor, Angela Merkel, wears the crown as the European Union's undisputed leader. Oddly, though, the Germans themselves do not see it like that. Many fret that their country is threatened by inequality and rampant, uncaring capitalism. They are insecure and fearful. They feel poor.

This gulf helps explain why Germany's proposed new coalition government, agreed on in the early hours of November 27th after five weeks of talks and a 17-hour final session, has coalesced around a set of policies that threaten to reverse some of the very reforms that made Germany successful. The deal, which sets up a "grand coalition" between Mrs Merkel's centre-right CDU-CSU and the centre-left SPD, still needs to be approved in a referendum by the SPD's 470,000 party members. The result of the vote, expected on December 14th, is far from guaranteed. But if it passes, Mrs Merkel will be saddled with a

leftish agenda that harks back to the era of Kraftwerk. Unless she can use her legendary political skills to water down these ideas, or, better, cast them aside altogether, Germany is heading for trouble.

That is because Germany's economy has been living off past glory—especially "Agenda 2010", a series of reforms launched in 2003 by Gerhard Schröder, Mrs Merkel's predecessor. But it is running out of puff. Labour productivity has grown less than half as fast as Spain's over the past ten years; and its overall rate of public and private investment, at 17% of GDP, has fallen by more than a fifth since the euro was introduced. No European country has carried out fewer reforms than Germany since the euro crisis began.

Back in the GDR

The coalition's 185-page "treaty" was a chance to launch a new reform agenda. Instead, its proposals are a mixture of the irrelevant—charging foreigners to use German motorways—and the harmful. For instance, it sets a new national minimum wage of €8.50 (\$11.50). That is relatively high, especially in eastern Germany. There, companies sometimes pay no more than €6, so the minimum is likely to price people out of work. It is also a departure from the more flexible German tradition of letting unions and employers negotiate in each industry—a system that helped keep German wages low during the early ►►

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According to the USDA's June 2012 Foreign Agricultural Service report, Coffee: World Markets and Trade, Latin America produced 81.1 million 60-kilogram bags of coffee in the 2011-2012 period, or around 59% of world production. In the same period, Latin America exported 59.17 million bags of coffee, 54% of the world total.

► years of this century when other euro-zone economies went on a binge that left them uncompetitive.

The coalition's pension policy seems even more retrogressive. These days, most advanced economies are expecting longer-living people to be longer-working, too. But the coalition wants the pension age, raised to 67 in the previous grand coalition, to be moved back down again for specific groups, in some cases to 63. France's president, François Hollande, was rightly mocked, not least by Mrs Merkel, for a similar ploy. Now the woman who has lectured the rest of Europe about the unsustainability of its welfare spending will follow down the same spendthrift road.

As well as doing plenty of foolish things, the treaty fails to do some sensible ones. The new government remains com-

mitted to the costly goal of closing all nuclear reactors by 2022, which has been especially hard on consumers who have to shoulder the bulk of the cost of the energy transition. And as for much-needed investment in public infrastructure, the accord proposes spending far less on bridges, railways and roads than the €7 billion or so a year that was recommended by a commission of government experts. According to one study, as many as 14% of Germany's highway bridges could be unsafe.

The impact on this coalition on the rest of Europe would not be all bad. One bonus is that, for all its primitive economic policies, the SPD seems keener to support some basic reforms such as the creation of a banking union. But that will count for little if Germany, the motor of Europe's economy, stalls. And, in the light of the coalition agreement, that is a real danger. ■

Thailand

The exile and the kingdom

Fixing Thailand's broken politics requires the government, the opposition and the monarchy all to change



YET again, anarchy threatens Thailand. Rival crowds of pro- and anti-government protesters have gathered in Bangkok. The (far more numerous) antis have occupied government ministries, prompting the government to extend special

security laws across the capital. The government has seen off a no-confidence motion in parliament but its future remains in doubt, in the face of challenges not just on the streets but also in the courts. Violence may return. Blame for the resurgence of the chaos that plagued Thailand in 2006-10 lies with the government, the opposition and the institution to which they both look for their legitimacy—the monarchy.

The government is led formally by Yingluck Shinawatra, the prime minister, but informally by her brother, Thaksin Shinawatra, a wealthy tycoon. Deposed in a coup in 2006 and later convicted of abusing his power, Mr Thaksin runs the government by remote control from self-imposed exile in Dubai. Thailand's social and business elites regard him as corrupt and high-handed, and are appalled by his populist economic policies. But, thanks in large measure to his popularity in the rural north and north-east, Mr Thaksin's party (its latest incarnation is called Pheu Thai) keeps winning elections—in 2001 and 2005, and (through proxies) in 2007 and 2011.

Until recently Ms Yingluck's government seemed to have reached an accommodation with the establishment. Then it pushed through the lower house of parliament a sweeping amnesty bill which would have let Mr Thaksin return home, while expunging thousands of other court cases. There was huge opposition to the bill, even among some of Mr Thaksin's former fans, who thought it went too far. It was thrown out in the Senate. Retreating, Ms Yingluck promised not to revive it.

Encouraged, the opposition pushed its advantage. The partially appointed Senate tends to side with the opposition, so the government has been trying to change the constitution to make it fully elected. On November 20th the constitutional court backed the opposition's view that the amendment was unconstitutional; it has yet to rule on whether those who vot-

ed for it broke Thailand's strict *lèse-majesté* law.

Like some of its predecessors, the government may thus be finished off by the judiciary. But even after the amnesty fiasco, Ms Yingluck may well win a fresh election. And in the meantime, the two sides' supporters slug it out on the streets, and Thailand totters.

Prince charmless

For this stalemate to end, three changes are needed. First, the opposition—led by the members of the main establishment political party, the Democrats—must abandon its undemocratic tactics. Its leaders want it both ways. They support parliamentary democracy when it produces the “right” result; when it does not, they resort to the streets, the courts or a phone call to army headquarters. That must stop.

Second, Thaksinite governments have to learn that they must use their electoral mandates not just to win the renewed votes of their supporters next time—still less to run government for Mr Thaksin's ends—but for the good of the country. That includes confronting corruption, ditching crazy policies, such as a price-support scheme for rice, and promoting a better business climate.

Third, the monarchy must stop playing politics and accept the symbolic role the constitution accords it. Two looming events have helped make Thai politics so frenzied. One is the 86th birthday on December 5th of Thailand's revered king for 67 years, Bhumibol Adulyadej. By tradition, harmony is supposed to prevail on that day. The king will probably be too frail to make his customary birthday speech. His unpopular son, the crown prince, is likely to succeed him. None of this is discussed in Thailand, for it would contravene the *lèse-majesté* (as this leader now does too).

This pernicious law blocks rational discourse about urgently needed reforms. Thailand's constitution not only has undemocratic elements, but also gives the central government too much power. That has helped fuel a long-running bloody conflict in the Muslim south. It may yet help spark another, in the Thaksin-supporting north-east. The royal family should give its explicit support to constitutional reform—and first call for an end to *lèse-majesté*. ■

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Britain's wasted years

SIR – Reading *The Economist's* conclusions on the British economy is always breathtaking (“Little England or Great Britain?”, November 9th). It is true that Britain has somehow muddled through the financial crisis as it has muddled through much else. But Britain is in a mess, despite your assurances. Foreign interest in Britain comes from its membership of the European market. Workers are relatively cheap and easy to get rid of. Important personnel are simply shipped in to run things.

To repeat the metaphor used by John Rose when he was chief executive of Rolls-Royce, Britain is like an aircraft-carrier: companies can easily land and leave. Their roots are not here, nor their senior management. Most of their R&D is overseas. Only a few settle, such as Nissan (which will leave if Britain pulls out of Europe) and BMW.

Over the decades Britain's management elites have abandoned our industries one by one. The political justification was that Britain must be the first to embrace the post-industrial world. The result is that the British people continue to pay the price of being ever more dependent upon inward investment to support their declining wealth. You make a virtue of this dire necessity.

Moreover, the statist model that you so readily dismiss has in fact created mighty global companies, such as Electricité de France, which distributes a large chunk of Britain's energy and is the lead developer in the new Hinkley Point nuclear power station. One asks why is this, given that Britain built the world's first big nuclear power station in the 1950s?

Britain is a wasteland of lost opportunities and failed policies. It is socially and economically dysfunctional. A measure of the depth of our failure is exemplified by George Osborne's trip to China to drum up support for both the funding and the construction of Hinkley Point and doubtless other power stations to follow. Reviled on

the one hand as a totalitarian state, China is welcomed on the other to bail out Britain.

RICHARD TUDWAY
London

SIR – The section in your special report (November 9th) examining the relationship with Europe cited Russell Bretherton, a British civil servant, telling a meeting of foreign ministers in 1955 to discuss political and economic union that the project would not get off the ground, and Britain would not sign up if it did. This is one of many versions of the words mischievously but quite erroneously attributed to Bretherton by a member of the French delegation, Jean-François Deniau. The full version reads: “Gentlemen, you are trying to negotiate something you will never be able to negotiate. But, if negotiated, it will not be ratified. And if ratified, it will not work.”

When these alleged remarks were quoted by the then president of the European Commission, Jacques Delors, in 1991 as illustrating the attitudes of the then British government they were widely covered in the British press and have been often repeated. The reality was quite different, as revealed by Bretherton's contemporaneous memos.

The key point, Bretherton wrote in August 1955, was that: “We have, in fact, the power to guide the conclusions of this conference in almost any direction we like, but beyond a certain point we cannot exercise that power without ourselves becoming, in some measure, responsible for the results”. He said publicly that: “If we had been able to say that we agreed in principle, we could have got whatever kind of common market we wanted.” But Bretherton's official brief was not to commit Britain to anything, and eventually he was simply asked to leave the meetings, which he did with much regret. How different subsequent history would have been if Britain had taken a more positive attitude in 1955.

JAMES BRETHERTON
Son of Russell Bretherton
Oxford

SIR – You would have benefited from a closer reading of that seminal text on Britain's relationship with the continent: “Asterix in Britain”. Maybe then you would have remembered the difference between Hibernia, which lies across the Irish Sea, and Caledonia to the north.

ANDREW COWLEY
London

Not so open and shut

SIR – You endorsed the idea of a lone assassin in President Kennedy's assassination, pointing to Gerald Posner's book “Case Closed” as evidence (“JFK, 50 years on”, November 23rd). Yet when “Case Closed” was published in 1993 you doubted its reasoning, concluding that it “does little more than smugly slant every piece of disputed evidence in favour of the lone-assassin theory—an approach exactly opposite to that of conspiracy writers, who follow every inference in the evidence to their own illogical conclusions” (“The death of a president”, October 9th 1993). You said at the time that “Case Closed” “no more closes the case than the many volumes inspired by conspiracy theories over the past 30 years.”

DAVID GIBBS
Professor of history
University of Arizona
Tucson

An unglamorous war

SIR – Using a picture of an attractive female FARC fighter in an article not only irresponsibly promotes a romanticised view of Colombia's guerrillas, it is a gross misrepresentation of who actually makes up the FARC's fighting forces (“Not out of the woods yet”, November 16th). The diminishing size and average age of its combatants is at its lowest point since its inception 50 years ago.

The average age of its child soldiers has dropped from 14 to 12. These facts are important because they reflect the FARC's military weakness, as well as the actual composition of its fighting forces: young rural peasants, who are forced

to trade their youth for the horrors of human trafficking, sexual violence and guerrilla warfare.

JULIÁN VALENCIA
Iowa City

Fruitless introspection

SIR – Your briefing on ubiquitous cameras claimed that “life logging” will have “much to recommend it” because the “potentially endless” re-examination of the life-logger's experience will “reveal opportunities to be healthier, happier and more effective” (“The people's panopticon”, November 16th). However, since everything in the life-logger's life is recorded, that record will presumably include recordings of the examination of prior recordings, then recordings of the examinations of those recordings, and so on. A point will soon be reached where the life being logged consists of nothing but commentary on commentary.

Samuel Beckett's one-act play, “Krapp's Last Tape”, features an aged man sitting before a tape recorder making tapes that are commentaries on prior tape recordings which are themselves commentaries. Technology moves on, but the message still holds: the endless re-examination of futility leads only to more futility, not meaning or effectiveness.

KIRK TEMPLETON
San Francisco

Say it as simply as possible

SIR – Congratulations on managing to use the phrase “preponderant criterion” in a chart (“On your marks”, November 9th). Was this the work of a kakorrhaphiophobic journalist set a challenge by his colleagues, or simply an example of glossolalia?

PAUL DAVIS
London ■

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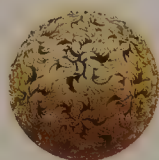
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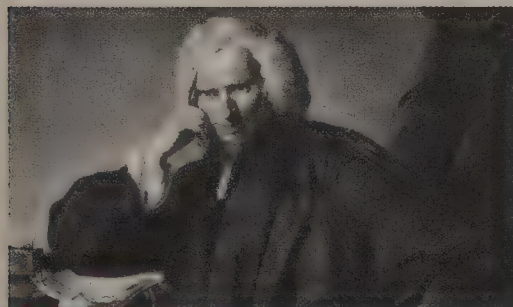
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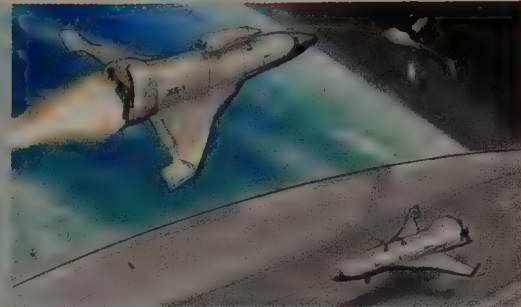
Early irreverence

Few 18th-century English novels still resonate like "Tristram Shandy". The book was rude and daringly innovative for its day, so it is all the stranger that it was written by a consumptive country parson, Laurence Sterne, born 300 years ago



Bullion backwash

The effects of India's attempts to curb gold imports are being widely felt in Thailand. Demand from consumers there is surging, something the World Gold Council attributes "in no small part" to the use of Thailand as a route to channel gold into other markets



From runway to orbit and back

Reusable spaceplanes able to take off from a runway like an aeroplane, fly up into orbit to deliver a payload and return to Earth would cut the cost of launching satellites. Nothing has yet come of these ideas, but the dream persists

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On Russia's ban on Moldovan wine, Nov 25th



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Well begun, not nearly done

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24 The effects on the region

An encouraging interim deal with Iran makes a permanent check on its nuclear ambitions easier to imagine. It will still be hard to achieve

THE interim deal concluded on November 24th between six world powers and Iran is much better than its many critics allow. In return for six months of “limited, temporary...and reversible” relief from some international sanctions, Iran has said it will not just freeze its progress towards a possible nuclear bomb, but actually take a few steps back. This, too, is limited, temporary and reversible; nothing is being decommissioned, and six months is a short time. But if further negotiations can cement the gains in place, they would mark a turning point in efforts to stop nuclear proliferation—and perhaps in regional politics more broadly (see next story).

The agreement was brought about by a multilateral process in Geneva and secret parallel discussions between the Obama administration and Iran which began in August, when Iran’s new president, Hassan Rohani, took office. Both sets of negotiations were conducted in an atmosphere of constructive endeavour, a far cry from the sterile declarations and mutual suspicion of the past.

A nuclear-weapons programme needs either uranium which has been highly enriched—something achieved by passing the stuff repeatedly through cascades of whirling centrifuges—or plutonium. At present the International Atomic Energy Agency (IAEA) reckons that Iran has almost 200kg of 20%-enriched uranium in a form that could easily be enriched up to

the 90% or so needed for a bomb. Under the terms of the deal (see table on next page) Iran will get rid of this stock, either by putting it in a form that is hard to enrich further or by mixing it with unenriched uranium, thus diluting it to less than 5%. At the same time it will freeze its enrichment capabilities at their current capacity, undertake no further enrichment beyond the 5% level, and do nothing to increase the 7,200kg stockpile of low-enriched uranium that is currently in a form that can easily be further enriched.

Speed bumps for breakouts

Mark Fitzpatrick of the International Institute for Strategic Studies, a think-tank in London, believes that the effect of the deal is to double the “breakout time” it would take Iran to produce enough material for a few nuclear weapons. Before the deal this was estimated at perhaps six weeks, and was steadily shortening.

The deal addresses the other possible route to the bomb by stopping most work on a reactor at Arak which was to have been ready for commissioning late next year. The Arak reactor is of a design particularly well suited to producing plutonium, and needs no enriched uranium in order to do so. Once the reactor is fuelled up, any attack on it would release a plume of radioactivity; this makes its commissioning something of a point of no return as far as military action against Iran is concerned.

The deal also stops all work on facilities that might be used to extract plutonium from its spent fuel. These constraints are in large measure thanks to the French, whose objections to insufficient action on Arak prevented an agreement from being reached two weeks earlier.

Iran has also said it will co-operate with a far more intrusive inspection regime; this makes the deal very different from the one reached with North Korea in 2005, which the Koreans then broke. Iran has promised to answer all the questions posed by the IAEA about what the agency refers to as the “possible military dimensions” of its nuclear programme. It will provide access to nuclear sites hitherto off-limits, possibly including the Parchin military base where Western intelligence agencies think it tested a detonation system for a bomb.

In return for taking these steps, Iran gets access to about \$4.2 billion held in currently frozen bank accounts and some easing of restrictions on trade in petrochemical products, precious metals and parts for aircraft and cars, a package thought to be worth \$7 billion to its economy over the six months. Sanctions on oil which will cost Iran \$30 billion over the same period remain firmly in place, providing a lot of leverage as negotiators start work on a final deal. Critics, though, argue that the psychological impact of relaxing these lesser sanctions will weaken the greater ones, particularly when it comes to some coun- ►►

► tries that have only toed the line with reluctance.

A stronger criticism is that the deal says nothing about Iran's "right" to enrich uranium, which the country sees as "inalienable". The Nuclear Non-Proliferation Treaty (NPT) gives signatories such as Iran a right to the benefits of peaceful nuclear energy. That can be construed as a right to enrich if the enrichment is for peaceful purposes, though other interpretations are available. Given that Russia, which built Iran's only large reactor, at Bushehr, has a ten-year contract both to provide its fuel and to remove its waste, it is very hard to see Iran's large and growing enrichment programme as entirely for peaceful purposes; the country's record of cheating when it comes to inspections makes it hard to trust. Yet the deal implicitly recognises that Iran will stay in the enrichment game.

Not there yet

But those insisting that Iran must forswear any enrichment in the future are demanding something that almost certainly cannot be negotiated. Whatever the pressure of sanctions, Iran will not consent to an agreement it regards as a national humiliation. Given the promise of the interim deal, ratcheting up sanctions now, as some in America's Congress urge, is more likely to weaken international support for America's position—and for the existing sanctions—than to draw concessions Iran would never otherwise make.

The objective of the negotiations' next stage will not be to make it impossible for Iran ever to acquire nuclear weapons. Instead, its aim should be to make it unfeasibly difficult for Iran to get a bomb by stealth and to stretch the period it would need for a nuclear breakout to a year or so, thus giving time to mount a response.

David Albright, a former weapons inspector and founder of the Institute for Science and International Security, a think-tank in Washington, DC, says a final deal will have to require Iran to abandon the Arak reactor—perhaps replacing it with one of a different design that has safeguards built in—and close its Fordow enrichment site, which is buried deep beneath a mountain and thus very hard to bomb. Iran would also have to adhere to the Additional Protocol of the NPT, giving IAEA inspectors enhanced rights of access to ensure that it is not cheating.

There is room for manoeuvre on the number and quality of the centrifuges that Iran could retain at Natanz (its other main enrichment site) the size of its low-enriched-uranium stockpile, and an Arak replacement. Also unanswered is the question of how quickly sanctions relief should be granted in return, and how long the agreement should last. American negotiators would be unhappy with anything less than about ten years. They think it will

The interim deal

Stocks of enriched uranium

- All uranium enriched above 5% to be diluted back to <5% or converted to oxide
- No increase in 3.5% enriched stock



Enrichment capabilities and fuel production

- No new centrifuges to be installed; no centrifuges to be produced for stockpiling to install later
- No next-generation centrifuges to be used for enrichment
- 50% of centrifuges at Natanz, 75% at Fordow, to be left inoperable
- No new enrichment facilities to open
- No fuel for Arak reactor to be produced, tested or transferred to the site
- No reprocessing facilities to be developed

Reactor development

- Work towards commissioning Arak reactor to stop
- Design details of Arak to be shared

IAEA inspection

- Daily access to Natanz and Fordow enrichment facilities
- 24-hour camera surveillance of key sites
- Access to centrifuge manufacture and assembly sites
- Access to uranium mines and mills
- More frequent access to Arak
- Commission established to answer questions concerning possible military dimensions of programme
- Provide all data called for in Additional Protocol

Source: The Economist

take that long for a culture of compliance and transparency to build up.

Getting a long-term deal that meets all those requirements will not be easy. Iranian negotiators may well be under pressure from factions at home to get tougher. Mr Rohani continues to enjoy the backing of the supreme leader, Ayatollah Ali Khamenei, who has the final say in all matters of state. But conservatives, including the ubiquitous and powerful Revolutionary Guard, will not just be loth to accept a plan that would stymie their ambition to acquire a nuclear bomb, as any final comprehensive deal must seek to do. They will also hate the idea of any deal that seems to point towards a "normalisation" of rela-

tions with America and the West.

Mr Rohani has been careful, so far, to give no hint that he would dilute the theocratic essence of the regime. Some of Iran's conservatives, though, fear that he could become an Iranian Gorbachev, a man whose attempts to reform the system and make peace with a long-standing enemy could lead to its downfall.

The Revolutionary Guard could, by obstructing the inspections the deal requires, do a lot to derail a more durable follow-up agreement. And the approach taken in the next stage of the negotiations could be less constructive than what has been seen so far. But enough has already been agreed to suggest that success is possible. ■

Regional responses

Shifting sands

A deal between America and Iran would have big repercussions

EVEN in a stable region, the prospect of an enmity as deep and long-standing as that of Iran and America coming to an end would herald wider change. In the Middle East, which has been in turmoil for the past two years, it seems bound to have an impact on almost every nation in the region, and on almost all the conflicts within and between those nations. If a rapprochement is really on the cards, a period of un-

certainty heaped on uncertainty is in the offing—one that could conceivably lead to better relations all round, but might well provoke further vicious competition for hegemony.

A satisfactory final deal on Iran's nuclear capabilities—no foregone conclusion (see previous story)—should remove the possibility of widespread conflict triggered by Israeli or American attacks on ►►



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► Iran. While Israel's prime minister, Binyamin Netanyahu, has railed against the interim deal, some in Israel have welcomed it on that basis. But if America has gone some way to sorting out one of its problems in the region, it may find the others looking more urgent than ever.

Like many in Israel, most Arab countries are worried that a deal would lead to a broader rapprochement between America and Iran. And they are alarmed by the risk that such a rapprochement could see Shia Iran, with a population larger than any country in the Arab world save Egypt, re-emerging as a regional hegemon.

The biggest regional powers—Saudi Arabia, Egypt and Turkey—are all concerned. Of the three, Saudi Arabia stands out as particularly cross. America, in its eyes, has let it down repeatedly of late; relations between the two countries have probably never been worse. The Saudis hated the way America tried to befriend the Muslim Brotherhood, which they loathe, when it recently ruled Egypt. As leaders of the Arab campaign to bring down the regime of Bashar Assad in Syria, which Iran supports, they were enraged when Mr Obama turned to Congress before responding to the use of chemical weapons in rebel-held districts of southern Damascus in August. They would rather have seen Mr Assad quickly clobbered.

With regards to the interim deal, the Saudis resent the fact that they were kept out of the back-channel negotiations that helped procure it, partly because America believed their presence would have made a deal less likely. They fear that an Iran no longer at loggerheads with America over the nuclear issue would be better placed to try and dominate the Gulf. They have long felt that Nuri al-Maliki, a Shia who has been running Iraq on increasingly sectarian lines since becoming prime minister in 2006, has become far too cosy with Iran. And they worry that Iran will intensify its suspected efforts to stir up its Shia co-religionists in the Saudis' eastern province, as well as in Bahrain, Lebanon and Yemen.

The deal comes at a time of awkward relations between America and Egypt, too. The secular-minded generals who overthrew the Brotherhood in July castigate America for sucking up to the Brothers during their time in power, as does the anti-Islamist part of the population. The Islamists, for their part, think America condoned—or even orchestrated, at Israel's behest—the coup against them. If America wants friendly voices to welcome the interim deal, it will not find them here.

It has found a few more of them in Turkey, where the government has applauded the deal. This, though, comes at a time

when Turkey itself has lost ground with Arab regimes, having failed to navigate the shifting of the sands in Egypt and Syria.

Just three years ago its forceful prime minister, Recep Tayyip Erdogan, was widely hailed as an exemplarily democratic and economically canny Islamist. He was valued as a mediator by the Israelis and Mr Assad's Syrian regime, among others. His cheerleading at the onset of the Arab awakening in 2011 put him starkly at odds with the Saudis and more secular types. But the Islamists in the revolutions' vanguard loved him. Turkey was the rising new regional power.

Threats and opportunities

Now it is at loggerheads not just with Saudi Arabia, but also with the regimes in Egypt, Syria and Iraq. The Syrian civil war, which risks spilling over into Turkey, is denting Mr Erdogan's popularity at home. The West is fretting over Turkey's inability to prevent an influx of jihadists from its territory into



Syria. Mr Erdogan has been accused of letting his country's policy of "zero problems with its neighbours" degenerate into one of "problems with all its neighbours".

Seen through this kaleidoscope of shifting alliances, rivalries and resentments, Mr Obama looks rattled. In the past, America has had several linked aims in the Middle East. One was to secure its oil supplies at steady prices. Another was to ensure the safety of its allies, especially Saudi Arabia, Egypt and Israel. A third was to stop anyone other than Israel from having nuclear weapons. A fourth was to contain if not squash jihadist groups, such as al-Qaeda. And a fifth, at least in President George W. Bush's era, was to promote democracy.

But the big powers—and America is still easily the biggest in the Middle East—will never have the ability, as they did half a century ago, to pick and control their allies and proxies. Though Saudi Arabia, Egypt

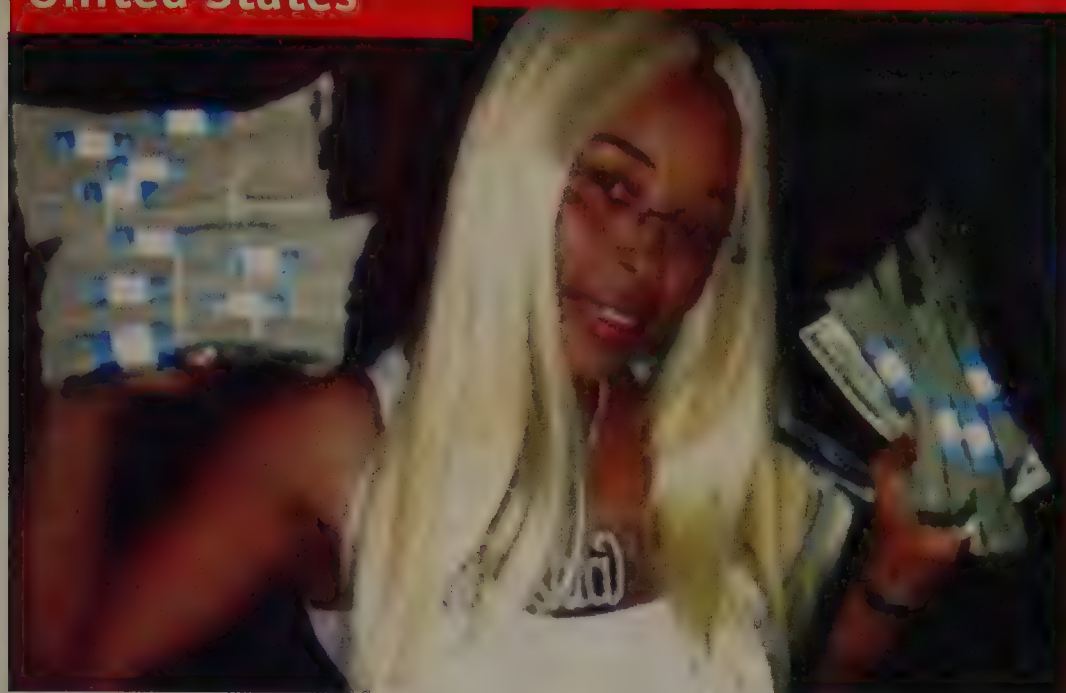
and Turkey still need American arms, which neither Russia nor China are likely to displace in a serious way, they want to flex their own muscles. If Iran comes back out of isolation into the regional arena, the configuration of rivalries and power will be still more complicated.

It is conceivable, however, that Mr Obama may yet achieve what he set out to do in the area. His fundamental aim has been to get out of two wars—in Iraq and, on the region's edge, Afghanistan—and not to get sucked into a third one in Syria, where he does not believe there is any chance of imposing a solution militarily. This distinguishes it from Libya, where, though "leading from behind", his administration ensured the downfall of Muammar Qaddafi. Over Iran, he has been determined neither to go to war to stop it getting a bomb, nor to let Israel risk doing the same. That looks more likely now than it has before.

If a rapprochement with Iran were to follow from a conclusive nuclear deal, new possibilities might open up in other conflicts. The former enemies might find, if not common cause, at least mutual interests. Hitherto a sturdy ally of Mr Assad, Iran might help broker an end to the Syrian civil war rather than see the conflict breed ever more of the Sunni fanatics it fears. Likewise, it is possible that Iran might lessen its backing for Hamas, the most intransigent Palestinian group, if offered the right diplomatic inducements. That could be useful.

No Israeli leader has ever excoriated an American president's policy as virulently as Mr Netanyahu, who called the interim deal an "historic mistake". To what extent his rejection comes from genuine fear that the deal is weak, and to what extent from the fear that a demonstrably non-nuclear Iran would have a new legitimacy in the region, is hard to say. If the deal sticks, the Israelis may over time come to accept it as the least bad option even if Iran increases its clout. But in the short run, it marks a new low in American-Israeli government relations.

Mr Obama and his secretary of state, John Kerry, have been striving to get Israel to negotiate a two-state solution with the Palestinians under Mahmoud Abbas. An Israeli government enraged by what it sees as Mr Obama's feebleness over Iran may be less keen than ever to oblige. Yet the prize that would underline America's role as still the most necessary of outside powers remains a permanent peace between Israel and Palestine. If Mr Obama achieves the makings of one between America and Iran, it could be a remarkable harbinger. But no one, in that tumultuous part of the world, should expect one success necessarily to feed another. ■



Stealing from the government

SIRF's up

ATLANTA AND TAMPA

Cleverer use of data and investigative collaboration can help cut fraud

UNCLE SAM is being bilked, big-time. Losses from health-care scams alone are between \$70 billion and \$240 billion a year, reckons the FBI. An ever higher percentage of frauds (false claims for welfare payments, tax refunds and so on) are being perpetrated with stolen identities. Some 12.6m people—one every three seconds—fell victim to identity theft in the United States in 2012, according to Javelin Strategy and Research. The problem only grows as benefit programmes strive for efficiency and convenience, shifting applications online and making payments to prepaid debit cards, which can be bought in shops, require no bank account and allow money to be laundered quickly and easily. The self-proclaimed first lady of tax-refund fraud is Rashia Wilson (posing with the loot on her Facebook page, above) who, along with her eager associates, claimed bogus rebates of more than \$11m.

A degree in computer science is not needed to steal personal data. Names, addresses and Social Security numbers can be nicked from doctor's surgeries, nursing homes and hospitals, either by insiders (a medical assistant was indicted in June for allegedly selling hundreds of names to feed his crack habit) or outsiders (who may distract secretaries and grab patient logs). Swindlers commonly prise information from the unsuspecting over the phone by posing as, say, Medicare reps. Some use the identities of dead people after trawling genealogical or family-support websites. The Affordable Care Act is a gift: complaints

about phone calls and visits from bogus Obamacare "navigators" are on the rise.

A favourite pursuit of identity thieves is tax-refund fraud, not least because the scope for abuse is so big: 145m individual income-tax returns are filed each year in America, of which three-quarters are entitled to a rebate. Using stolen personal details and made-up withholding forms, a fraudster can apply online for dozens of refunds a day, to be sent to addresses of his choosing. When the real taxpayer tries to file a return (assuming he's alive), the IRS rejects it, and the mess can take months to sort out. So common is this scam that it has its own acronym, SIRF (for Stolen Identity Refund Fraud).

Some who have been caught at it admit to working on an industrial scale, putting in 12-hour days with a dozen or more accomplices, each filing return after return on laptops. Some street gangs are moving from drugs to refund fraud because it is more lucrative, less physically dangerous and, in some states, much less harshly punished. The craze has even spread to prisons. The IRS caught more than 170,000 dodgy requests from inmates between January and September of last year. How many slipped through the net is anyone's guess.

The war against fraud is increasingly being waged from business parks in leafy suburbs such as Alpharetta, north of Atlanta. In an inconspicuous low-rise building belonging to LexisNexis, an online-information firm that is part of Reed Elsevier, dozens of computer racks, each holding 80

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servers, link up with each other (and a sister site in Boca Raton) to form a vast super-computer. These black boxes house a five-petabyte database, big enough to hold the DNA of America's entire population 15 times over. To keep them from overheating, cold air is blasted against them through floor vents, then sucked into the ceiling to be re-cooled. In a nearby control room a team monitors the system on a giant screen filled with spider diagrams.

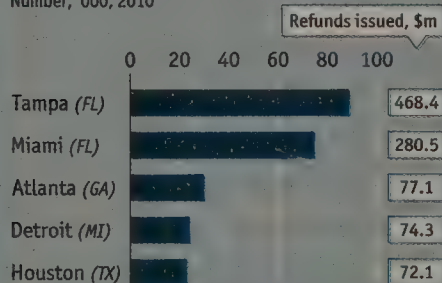
LexisNexis's data trove includes everything from property, vehicle-registration and other public records to legal filings and proprietary data bought from firms that serve consumers, such as insurers. Along with other information providers, including credit bureaus such as Equifax and Experian, it has been busily developing its "risk solutions" business in recent years. A big part of this is helping the government spot fraudulent requests for cash, preferably before the money goes out of the door.

Some 30 state and federal agencies use fraud "filters" designed by LexisNexis that run requests against the millions of names, addresses and other bits of personal information in its database and flag those that look suspicious (because, say, they share an address with 20 similar requests). These can quickly identify patterns that would take months to spot through manual investigation. The filters are developed by "data scientists" who combine maths wizardry with data skills and knowledge of the government programme being defrauded.

Georgia is a pioneer. Its Department of Revenue uses LexisNexis to flash up potentially fraudulent requests. Those who make them are contacted and asked multiple-choice questions about past addresses, vehicles they have owned and the like. Only those who answer them all correctly get the refund. (They have two chances.) The results are impressive. Of the 4m returns filed in the state last year, 160,000 were found to be iffy. Total savings were

Fraud central

Top five cities for potentially fraudulent tax returns
Number, '000, 2010



Source: Treasury Inspector General for Tax Administration

► \$110m, of which Douglas MacGinnitie, the revenue commissioner, attributes \$23m directly to the fraud filters, which cost just \$3m to set up and run. Mr MacGinnitie embraced the analytics-based approach after experiencing refund fraud first-hand: his wife's 2010 return was rejected because, it later transpired, someone had filed a fake return in her name, claimed the rebate on a prepaid card and vanished with the cash.

In another state (it won't say which) LexisNexis helped uncover a group that had set up a "virtual apartment block" of post boxes in a shopping mall and used it to claim \$16m of refunds for dead people from other states. The money, claimed in amounts below \$10,000 so as not to trigger anti-money-laundering filters, disappeared to Russia. Numerous other fraudsters have had links to the former Soviet Union, including an Armenian-led group indicted in September that had used foreign students who were staying only briefly in America to claim \$7m of bogus refunds using 2,000 stolen identities.

Florida has the highest rate of ID theft, and its joint capitals are Miami and Tampa (see table above). Fake returns in and around Miami are more than 40 times the national average. A number of factors make the state vulnerable to such scams, among them its crowds of pensioners, large numbers of immigrants with poor English (who can be more easily duped into disclosing personal information) and its high rate of people who do not have to file tax returns (meaning more stolen numbers can be used without detection, because they do not generate duplicate filings). So many people stopped by Tampa police in 2011 were found to have lists of stolen IDs on them that the city's exasperated mayor, Bob Buckhorn, declared the IRS "missing in action".

The agency responded last year by creating a task-force, the Tampa Bay ID Theft Alliance, with federal prosecutors, the Florida Department of Law Enforcement, Tampa's police, county sheriffs and Crime Stoppers. This has helped in a number of ways. Leads are more easily shared. IRS investigators benefit from a closer relationship with local law-enforcers who are nearer the action. As one task-force mem-

ber puts it: "This type of fraud is white-collar but also street-level, so it makes sense to pool resources."

As a combined force, the group has been more effective at lobbying for change. It persuaded state lawmakers to make it a felony to be in possession of more than five Social Security numbers without a good excuse. (Previously, even someone with 500 could walk free unless prosecutors could prove intent to defraud, which is tricky.) It has also convinced local banks and credit unions to call when they see unusual withdrawals from ATMs, rather than merely filing suspicious-activity reports. These measures have helped push up convictions and may have spurred the increase in sentences, too—including the 21-year jail term handed in July to Ms Wilson.

The cost of not checking

Such initiatives are helping to soften criticism of the IRS, which peaked after a report by the Treasury Inspector General for Tax Administration found the agency might have sent out 1.5m potentially fraudulent refunds in 2011, including 655 to a single address in Lithuania. (In 2010, almost 4,900 went to the five most popular American addresses.) The IRS insists it is getting to grips with the problem. It has doubled the number of employees working full-time on ID theft to 3,000, even as its budget has been cut. This has helped reduce the average time it takes to resolve cases from ten months to four, and has raised the amount of fake refunds that are blocked before being sent out to \$20 billion in the 2012 tax cycle, from \$14 billion the year before. The IRS could cut losses further if it were able to delay posting refund cheques until it had time to cross-check them against income data from employers, which it receives weeks later. But that would require an act of Congress, and there is little political support for making people wait longer for their money.

Like the IRS, the Centres for Medicare & Medicaid Services, which administers those two programmes, is increasingly using "big data" to screen demands for money. Florida's department of children and families, which doles out Medicaid payments, food stamps and cash assistance, recently extended a four-county pilot project with LexisNexis across the state after it

flagged up dodgy online applications at an annualised rate of \$60m—more than 50 times the project cost. The filters caught one woman who was claiming food stamps in all 50 states.

Officials in New York City are also using computing power to cut fraud losses, egged on by its outgoing mayor and data evangelist, Michael Bloomberg. Its social-services department is developing an algorithm that will identify those recipients most likely to have unreported income. The key, says James Sheehan, chief integrity officer of the city's Human Resources Administration, is to combine such analytics with traditional detective work, such as property visits and phone calls.

It may seem odd that more agencies have not adopted this approach, given its apparently healthy return on investment. Some have just been slow to twig or have got caught up in other priorities, not least the Obamacare roll-out. Others have shown interest, but have been unable to secure funding or to get other agencies to work with them. States are also being held back by federal caution over the new data-driven approach. Take food stamps. The Department of Agriculture (USDA), which oversees the scheme, requires manual, paper-based verification of applicants, based solely on the information they provide. Florida was the first state to receive a waiver allowing it to verify electronically, using data from third parties. The USDA wants to see its system in action for several quarters before it grants the exemption to others.

States that lag behind may see things get worse before they get better. The Tampa task-force believes that several tax-refund fraud rings may have left Florida to set up operations in other states, including Texas and Missouri. Mr MacGinnitie says attempted tax fraud seems to be down this year in Georgia, but it is too early to say if that is because the swindlers have gone elsewhere, or because they have got more astute. They tweak their techniques as required. Some have moved from filing with stolen Social Security numbers to using Individual Taxpayer Identification numbers, which are handed out to legal immigrants. Others have found that filing joint returns helps them slip through the net. As one of the task-force members concludes: "We evolve, they evolve." ■



Chrome-plated on the IRS

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IT'S AMAZING WHAT I.T. WAS MEANT TO BE.

The Senate and the filibuster

Dropping the bomb

WASHINGTON, DC

A change to the Senate's rulebook will make governing a little easier

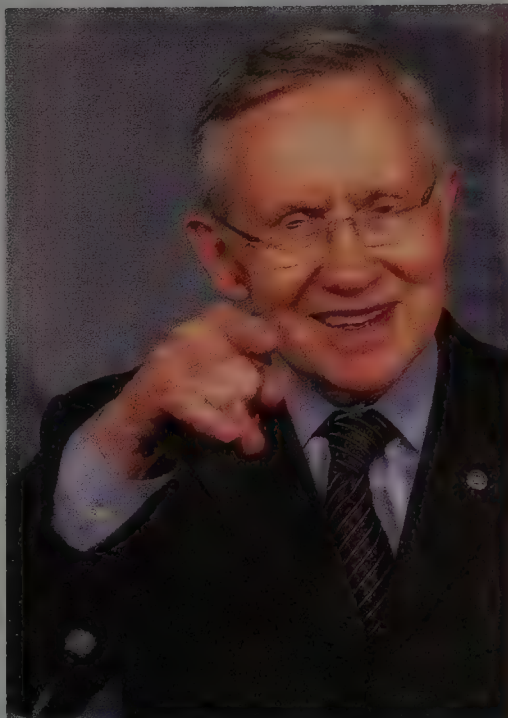
USED in the context of discussions on parliamentary procedure, the "nuclear option" was highly enriched hyperbole. On November 21st it was detonated, as it were. A rule-change passed by the Senate (chief mover Harry Reid, the majority leader) means that the minority party there will no longer be able to filibuster, or talk out, some nominees to the federal judiciary and the executive branch (though the filibuster remains in place for legislation and for nominees to the Supreme Court). Such appointments can now be made with the support of a simple majority. So far there has been no sign of fallout. Nevertheless, the way America governs itself has been altered.

Curbing the filibuster, which hands the minority party a powerful tool to thwart the majority, has long been discussed. Both parties refrained from doing it, partly out of a self-interested fear about what would happen when they next found themselves in the minority, partly from some lingering sense that the Senate ought to be a polite place where lawmakers reach across the aisle to make deals. Why did Democrats, who have a majority in the Senate, decide to break with precedent and make the change?

The move reflects general gloom at the prospect of getting anything significant done before the next electoral cycle. Because there are no big bills likely to pass Congress, there is little incentive to keep things civil. Senate Democrats would rather get some people they approve of into important positions.

There is also an important payoff for making the change now. There are close to 100 vacancies in the federal judiciary to be filled. That number is partly coincidence: presidents have limited control over when judges die, retire or get promoted. But it also reflects the fact that Republicans have been more active in blocking the president's judicial nominees than Democrats were when Republicans last held the White House. The success rate for nominees under George W. Bush was 91%. Under Barack Obama it has fallen to 76%—and those numbers do not reflect the amount of time nominees have had to wait before confirmation.

Something similar has been going on in the executive branch. Preventing presidential nominees from taking up their positions in government agencies has become a favourite way for Republican senators to put leg-irons on the president's policies. This tactic has been suc-



Trigger-finger Reid

cessful in preventing the Federal Labour Relations Authority from doing anything; it has also temporarily denied agencies, from the Federal Housing Finance Agency to the CIA, of confirmed heads, without whom they may drift along in an ineffectual way that pleases some small-government types. Such blocking often bears no relation to whether the nominee is qualified. Chuck Hagel, a Vietnam veteran, recipient of two Purple Hearts and former Republican senator, was blocked by his former colleagues from heading the Department of Defence.

Though this is not new, it has become much more common under Mr Obama. Between 1949 and Mr Obama taking office, 68 nominees had been blocked by the Senate. Since January 2009, 79 have been. The blockers justify this by pointing to Mr Obama's habit of using government agencies to make policy, rather than merely carry it out. Mr Obama's response has been to make some appointments while the Senate is on holiday, which looks equally unconstitutional.

To the extent that getting rid of the filibuster for some nominations reflects a further decline in the civility that was once thought to characterise the Senate, the change is regrettable. But politesse was dropped some time ago. It makes sense to update the rules accordingly. If that means Republicans find it a little easier to get their way when they eventually win a majority, that is no bad thing.

Regulating political spending

Lighten our darkness

NEW YORK

Proposed new rules for non-profits aim to stop dark money going into politics

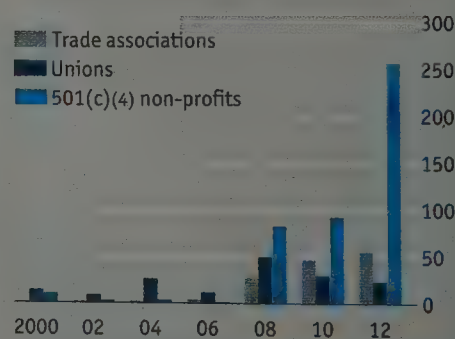
THE \$180m raised last year by Crossroads Grassroots Policy Strategies included 50 donations of at least \$1m. No one knows who those generous people were. Crossroads, co-founded in 2010 by Karl Rove, a Republican strategist, does not have to reveal its donors because it is registered as a non-profit "social welfare organisation" under section 501(c)(4) of America's tax code. Chief among the groups receiving grants from Crossroads was Americans for Tax Reform, a group founded by Grover Norquist, which during last year's elections extracted pledges on tax and spending from Republican politicians.

To its critics, this made Crossroads the most egregious example of "dark money": anonymous donors financing political campaigns under the guise of traditional social-welfare charity. The volume of dark money has soared in recent years (see chart). Last year some \$256m was spent on political ads, phone calls and mailings by around 150 501(c)(4) non-profits. Most of this was by conservative groups; only 15% was from the left and centre, such as Organising for America, which raises funds for Barack Obama.

On November 26th the Treasury and Internal Revenue Service proposed new rules to curb the political activity of 501(c)(4) non-profits. The rules focus on prohibiting certain political activities explicitly, such as specific support for a candidate in an election. They are carefully even-handed; yet they go much further than had been expected, defining as political activities what used to be seen as non-political democracy-building, such as non-partisan voter registration and get-out-the-vote campaigns. Many mainstream non-profit groups are alarmed by this, even though ►►

Roaring up

Spending by politically active non-profit organisations, \$m



Source: Centre for Responsive Politics

▶ they had campaigned for dark money to be reined in by regulators.

The proposed rules are a response to social-welfare charities being used for a purpose they never previously had, as money denied its traditional voice sought new ways to influence politics. That, at least, is the view of Howard Husock of the Manhattan Institute, a conservative think-tank. He thinks the best way to restore 501(c)(4) charities to their non-political role would be to scale back the restrictions on the political role of money that forced donors to seek new vehicles in the first place. Many other conservative commentators simply dismiss the new rules as politically motivated, even though not all dark money comes from the political right.

The proposed new rules would apply only to 501(c)(4) organisations, not to (c)(5) or (c)(6), notes Kim Barker of ProPublica, a news outfit that has done pioneering research into dark money. Because most money going to (c)(5) groups is from trade unions, anonymous wealthy donors may be tempted to switch to (c)(6) groups, which are mostly trade associations, such as the US Chamber of Commerce and Freedom Partners, a group set up by Charles and David Koch, two conservative billionaire brothers. But Marc Owens, a lawyer who works to tackle dark money, says the proposed rules are sufficiently ambiguous not to shut down the big partisan players. They could, however, restrict non-partisan organisations such as the League of Women Voters, which provides information on elections to its members.

The consultation process is likely to be fierce, but it is still uncertain whether the new rules that emerge will be enforced. Since 2010 only one small non-profit has been denied tax-exempt status by the IRS on political grounds. Unless the IRS makes this a higher priority, it may be some time before the days of dark money are over. ■

Poverty in California

Not so golden

LOS ANGELES

America's biggest state has America's biggest poverty problem

AS DIRECTOR of development at the Second Harvest food bank in Riverside, California, Tracylyn Sherit is used to fielding tales of hardship. But these days they sometimes come from unexpected quarters. An elderly woman in Palm Springs, a reasonably prosperous tourist town in eastern Riverside County, recently called, desperate for help: her family were visiting for Thanksgiving and she could not afford to feed them.

Riverside County is part of the Inland Empire, a vast sprawl east of Los Angeles that was whacked by the housing bust. California's inland areas, such as the Inland Empire and, to its north, the agricultural lands of the San Joaquin Valley, have long lagged the coast on indicators such as employment, income and education. At the California Economic Summit, a recent gathering of state worthies, all the talk was of "two Californias": the wealthy coastal part and the struggling inland bit. Cities like San Bernardino and Fresno reek of poverty and sadness.

But two recent reports suggest that poverty in California's coastal areas may have been significantly understated, thanks largely to high housing costs. The US Census Bureau's traditional measure, which pegs the poverty line at \$23,492 for a family of four, ignores geographical variations in the cost of living, as well as non-cash benefits such as tax credits. Include these and the poverty rate in Los Angeles County (America's largest by far by population)

climbs from 18% to 27%, according to a recent report from the Stanford Centre on Poverty and Inequality and the Public Policy Institute of California, a think-tank. Most other cities also see big jumps; San Francisco's rate nearly doubles.

On this accounting California's poverty level rises to 22%. The Census Bureau's "supplemental poverty measure", which uses a similar methodology, has it at 23.8%, the highest in the country (by the traditional measurement California is 14th). In America's biggest state, more than 8m people struggle to meet their everyday needs. Over one-quarter of children live in poverty. But California has spent so long grappling with its fiscal woes that this has been neglected. "Everyone knows it's an issue," says John Husing, an Inland Empire economist. "But no one is talking about it."

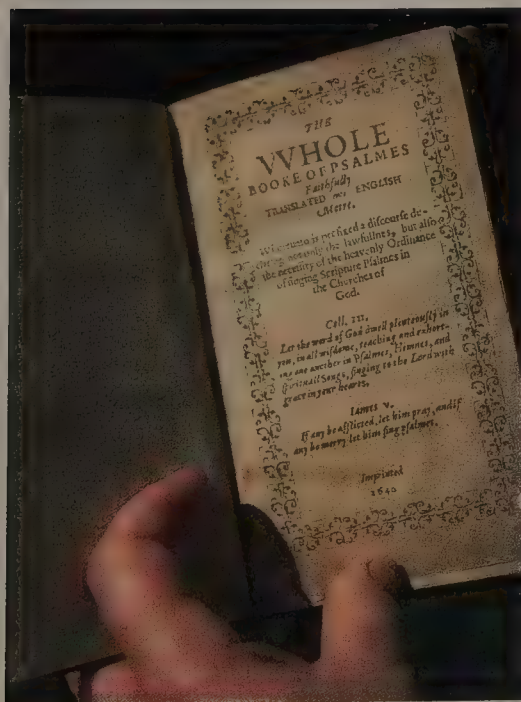
The unavoidable cuts to social services have been biting hard. A recent rosy report from the state's fiscal analyst has spurred calls from Democrats to repair the safety net. But Jerry Brown, the governor, seems determined to hold the line. Nor does he seem too concerned by the high poverty rate, which he recently described as "the flip side of California's incredible attractiveness". Low-skilled immigrants flock to the state, he argues, and take low-paid jobs. At best this simplifies the issue. California is not the magnet for foreign immigrants it once was; educating and integrating their children is now the main task. But there is no hiding the ethnic divide. Almost one-third of California's 15m Latinos live in poverty. Two-thirds of Latino adults have a high-school diploma at best, compared with 26% of whites and 36% of blacks.

In fairness, Mr Brown has not been idle. He has adjusted school-finance formulas to send more cash to poor areas, and has cautiously backed fracking in the vast Monterey oil shale, which may one day generate serious wealth and jobs. More immediately, he has approved a rise in the state's minimum wage to \$10 an hour, beginning in 2016 (although some business groups fear this will kill jobs).

But he faces strong headwinds. The state may be piling on jobs, but from a low base: at 8.7%, the unemployment rate is still the fifth-worst in the country. Add the underemployed and discouraged, and California is second only to Nevada. One third of America's welfare recipients live in the state. California is also hollowing out: between 2007-09 and 2010-12 the number of people earning between \$50,000 and \$100,000 fell by almost 75,000, while every income bracket above and below grew. Income inequality is higher than in almost any other state, by one measure. The elites of the Bay Area are thriving, and growing in number, even as the poor of the Inland Empire struggle to survive. Without some sort of policy fix, and soon, California will be the Golden State only for the few. ■

The Bay Psalm Book

It is yellowed, battered and unassuming; but on November 26th the Bay Psalm Book, the first book printed in what would become the United States, sold at a Sotheby's auction for a record \$14.2m. The book was published in 1640, using a press shipped from England. It was clearly well used and (from its marginal marks) well studied. Ten other copies survive; this was the first to appear at auction since 1947. The seller was the Old South Church in Boston, which also owns another copy. The new owner, David Rubenstein, head of the Carlyle Group, a private-equity firm, will lend his purchase to libraries across the country. There, this small "Whole Booke of Psalmes, Faithfully Translated into English Metre" will silently display the values of political and religious liberty that created the United States.



Criminal justice

Measure for measure

ATLANTA

Can asking better questions reduce America's prison population?

EARLY on the morning of February 26th 1988 a young police officer in New York, Edward Byrne, was killed with five shots to the head. He had been watching the house of a witness. In response, Congress created what would eventually become the Edward Byrne Justice Assistance Grant (JAG) programme. Run by the Bureau of Justice Assistance (BJA), an administrative division of the Justice Department, the programme is the largest source of federal funds for state and local crime-fighting.

Between fiscal years 2005 (the first year of the JAG programme in its current form) and 2013, it disbursed an average of \$411m a year to all 50 states, as well as six territories and roughly 1,000 communities, using a formula based on population and the violent-crime rate. States can then distribute those funds to local agencies. JAG grants can be used to pay for witness protection, drug-treatment programmes and so on, but most of the money—64% between 2009 and 2012—goes to law enforcement.

In 1988, when the programme was created, American cities faced soaring crime rates. Today the problem is that too many people are expensively locked up. A new report from the Brennan Centre for Justice, a law and public-policy institute in New York, suggests that the JAG programme may be partly to blame for this.

The problem, says Inimai Chettiar, who directs the Brennan Centre's Justice Programme and was the report's main author, is numbers. When BJA collects data from JAG recipients on how its funds were used, it asks for quantities: how many people were arrested, what quantity of drugs was seized, and the like. According to Ms Chettiar, those criteria lead many recipients to believe that the Justice Department expects them to use JAG money to arrest more people and seize more stuff. As Jim Bueermann, a former chief of the Redlands Police Department, says, "In a police department, if you ask a traffic officer how many tickets he wrote today, their emphasis is on writing tickets to meet a number, as opposed to a desired outcome, which is safer streets."

With criminal justice, the broader goal is to keep communities safe and to spend taxpayer dollars efficiently. To that end, the report suggests that the BJA should ask different questions, such as what share of defendants prosecutors sent to treatment rather than prison, and what share of defendants did not reoffend, rather than fo-

Rural pursuits

Death by dehogafler

CHICAGO

The high-tech way to hog heaven

WILD pigs are rooting around in a field in the dark. Partly hidden by tall grass, their tails wag happily as they snuffle around for roots and insects. A shot rings out and the biggest pig is down. The rest scatter quickly; yet a shooter picks them off one by one with uncanny accuracy.

Pigs are clever and hard to hunt; it can take a day to stalk one. But they are no match for an aerial drone such as the "dehogafler" operated by Louisiana Hog Control, a pest-extermination firm. It is a remote-controlled aircraft with a thermal-imaging camera and a laser pointer. It easily spots the pigs' warm bodies from 4,000 feet and points them out to a hunter on the ground wearing night-vision goggles, who then shoots them.

Each year America's 6m feral pigs cause an estimated \$1.5 billion of damage to crops, lawns and wildlife. In May *The Economist* reported that Texans were trying to shoot them from helicopters

under the state's "pork chopper" law. This turns out to be ineffective. Helicopters are noisy; pigs quickly learn to hide from them. Drones, by contrast, are quiet. Cy Brown of Louisiana Hog Control guesses that, working on weekend nights over the past three years, he and his partner have dispatched around 300 porkers to hog heaven.

People have two objections to hunting with drones. Some animal-lovers think it cruel. "This is disgusting. I really feel sick," comments one under the "2013 Pig Killing Highlights" video, complete with perky soundtrack, on Louisiana Hog Control's Facebook page.

Traditional hunters think it unsporting. Hunters are supposed to stalk an animal using wit and woodcraft, says Tim Brass of the Backcountry Hunters and Anglers Association. The Colorado Parks and Wildlife Commission recently agreed to consider draft regulations to ban the use of drones for hunting or scouting in Colorado.

However, the rules that apply to hunting for sport typically do not apply to pest control. It is illegal in many states to hunt or scout for elk or deer from the air, but pigs are fair game. A law in Louisiana specifically allows private-property owners to hunt "outlaw quadrupeds", such as coyotes, hogs and armadillos, at night. Farmers welcome Mr Brown and his drone onto their land. He explains: "If you were to hunt deer from an aeroplane you would be put in jail; if you do pigs you get a high five."

He adds that, although he has a reputation as a bloodthirsty killer to maintain, he has a soft spot for the cutest pigs. "Sometimes I feel bad. I've got one as a pet, Curly. Truth is I shot his mom and he was there in the water and he would probably have died. I took him home and he lives with us and eats peaches and oatmeal." Mr Brown says he consumes as many of his kills as he can, however. Curly's days may be numbered.



Have drone, will feast

cusing on the sheer numbers processed through the system.

Ms Chettiar says that the Justice Department has expressed "some interest in taking these measures up". Others, too, have recently proposed JAG reforms. In 2010 and 2011 Steve Cohen, a Democratic congressman from Tennessee, introduced a measure that would have required JAG recipients to reduce racial disparities in their justice systems. Earlier this year two sena-

tors—Patrick Leahy, a Democrat from Vermont, and John Cornyn, a Republican from Texas—introduced a bill requiring states to have an annually updated strategic plan for spending JAG funds. And Barack Obama's 2014 budget proposed \$40m in incentives to promote better use of JAG money. This is not mere fiddling with measures. As Mr Bueermann says, in institutions people understand that "what gets counted counts." ■

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your body

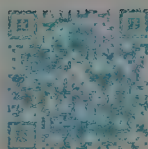


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Lexington | If Walker runs

Wisconsin's union-bashing governor stokes talk of a Republican White House bid



TO ACHIEVE big things politicians need more than talent and a bit of bravery—they must be lucky in their choice of opponents. By that measure Scott Walker, Republican governor of Wisconsin, is a lucky politician. Lots of states have shaky public finances. Several Republican governors have responded with schemes to slash spending, cut taxes, curb unions and rethink pension and health-care promises. Many have faced resistance, and some (eg, Ohio's governor, John Kasich, and Louisiana's Bobby Jindal) have seen their boldest plans thwarted. Mr Walker fought hard to push through a raft of conservative policies after winning office in 2010. But good fortune was a key to his success: his opponents overdid their counter-attack, repelling voters.

After Mr Walker announced plans to curb collective bargaining for state workers, the state capitol was besieged for months by thousands of protesters. Politicians were picketed at home. Unknown extremists sent death threats targeting the governor and his wife—we will “gut her like a deer” said one note—as well as their two teenage sons.

Wisconsin, with a progressive tradition dating back to early German and Nordic immigrants, has voted Democratic in each presidential election since 1988. But unions overreached in calling an election to recall (ie, sack) Mr Walker in June 2012. Instead he won more votes than in 2010.

Not all those backing the governor's reforms were traditional Republicans. When state workers grumbled at being asked to pay more towards their pensions and health insurance, they found limited sympathy among neighbours who have long paid into pensions and health schemes. Surveys by the Marquette Law School Poll found a marked divide between the views of private- and public-sector union households. They also revealed the existence of “Obama-Walker voters”, the one-in-ten Wisconsinites who support both the Democratic president and Republican governor.

Mr Walker is now trying the national stage. On November 19th he published a book, “Unintimidated”, describing his Wisconsin battles and all but declaring himself a contender for the 2016 Republican presidential nomination. He suggests that the party's next White House contender should be a problem-solving governor, rather than a member of the dysfunctional, much-

reviled Congress (though he makes a tactful exception for Paul Ryan, a Wisconsin congressman who was Mitt Romney's running-mate in 2012). That is a heroically self-serving observation: a stiletto jammed into the ribs of such rivals as Senators Ted Cruz, Rand Paul and Marco Rubio. It is also probably true.

And it leaves standing Chris Christie, subject of much 2016 buzz, recently re-elected New Jersey's governor by a crushing margin. Mr Walker praises his swaggering colleague as admirably “in-your-face”. “I have more of a midwestern filter,” he adds delicately, making that sound a good thing to have.

Lexington met Wisconsin's governor on the sidelines of a charity event in Milwaukee. Mr Walker, the 46-year-old son of a Baptist minister, could pass for a youth pastor: all prim amiability and very neat hair. God is never far from his writings or conversation: he senses signs from God when a book opens at an apposite page, or in a timely gesture of support from a stranger. At other times he betrays flashes of ambition, and sounds as if his next, hapless opponent is the national Republican Party itself. Although he opposes Obamacare he is nonetheless planning to use it, for now, to cover poorer Wisconsinites, as a lesser evil than leaving them without cover. Washington Republicans must stop “gloating” and yearning for Obamacare's failure, he says. They may dislike the law, but should remember that its collapse is a frightening prospect for real people.

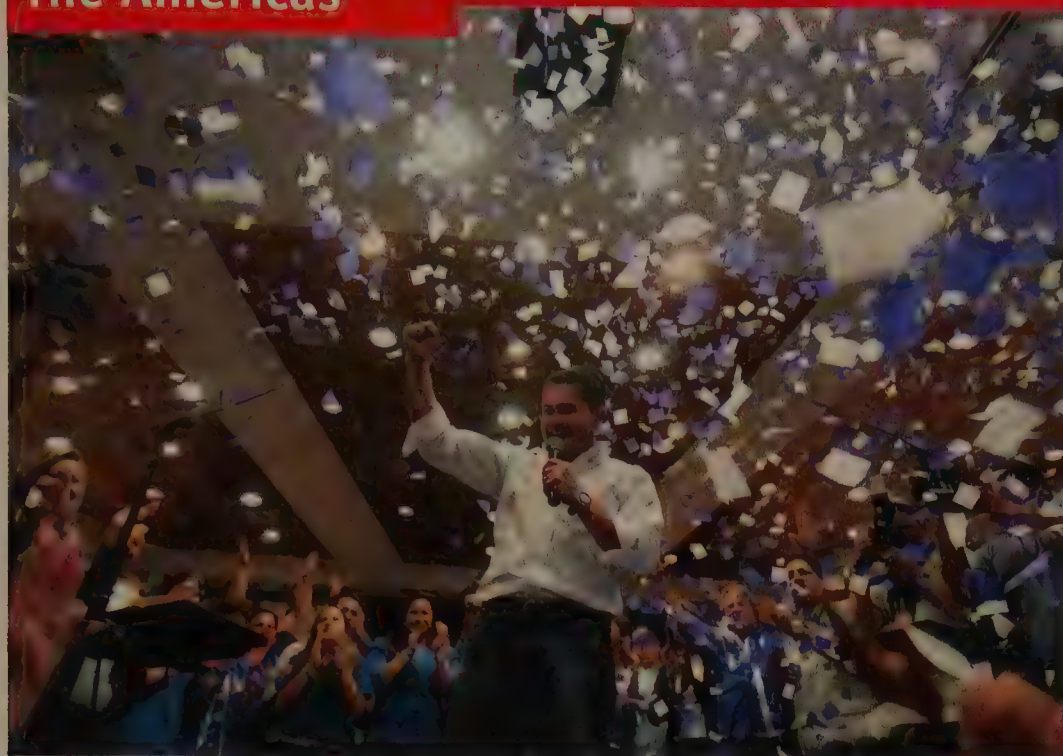
He reserves harsh criticism for his party's 2012 presidential nominee. After the 2012 recall election he was appalled to hear Mr Romney declare that Wisconsin's lesson was that Americans do not want more teachers, police or firemen. A disastrous misreading, says Mr Walker: Wisconsin's reforms were to strengthen vital services. Republicans should not hate government, he adds; they should loathe the big, wasteful government.

The governor thinks Obama-Walker voters are best understood as a “persuadable” voter bloc: cynical about politics and greatly concerned with fairness. Mr Obama convinced voters in 2012 that the rich were not paying their “fair share”. Mr Walker targeted the unfairness of union contracts that pamper insiders and do not reward merit. Republicans need to own “fairness” as an argument underpinning all their policies, he suggests.

Wisconsin, 83% white, is not today's America

Mr Walker combines a knack for economic populism with better manners than Chris Christie. Yet his crossover appeal should not be exaggerated. Mr Christie won half the Hispanic vote in his re-election, and shares power with a Democratic-run legislature. In contrast Mr Walker pushed his reforms through after Republicans took control of all branches of Wisconsin government. On issues from guns to abortion, he is a sternly down-the-line conservative. He scrapped college subsidies for young illegal immigrants brought up in his state. Asked what the federal government should do about millions of illegal migrants in America, he has “no proposal” just now. (“I'm a governor,” he protests.)

Mr Walker needs to think harder about a changing electorate. Currently he says that Hispanics and other growing groups matter nationally, but Republicans need only “make inroads” with them. He cites demographic studies showing that, in key battleground states, Mr Romney did badly by losing “Reagan Democrats”. If he is saying that Republicans can woo blue-collar whites and ignore minorities, that is suicidal advice. He is a serious challenger and a shrewd critic of his out-of-touch party. But elections are not won by treating the new America as an opponent. ■



Honduras's presidential election

Mano dura wins the day

TEGUCIGALPA

The new president of a violent country will have a weak mandate but threatens to brandish a big fist

WHEN Juan Orlando Hernández (pictured), the winner of Honduras's presidential election of November 24th, was involved in a minor helicopter crash eight days before, he clambered out, fell to his knees and thanked God for saving his life. Since then, the 45-year-old right-winger who grew up in a rural family of 17 children has done his best to show that he is the chosen one. "The voice of the people is God's voice," he claimed, defending a victory his main opponent disputed.

Mr Hernández, who is reputed to be an adept political operator, badly needs a *deus ex machina* to help him when he is formally declared president-elect of a country that had the world's highest murder rate last year (about 20 Hondurans are killed each day). The election marked the fragmentation of what was a stable two-party system, in which Mr Hernández's conservative National Party alternated in power with the slightly less conservative Liberals. That cosy arrangement began to crack in 2009 when Manuel Zelaya, a Liberal who had embraced Venezuela's Hugo Chávez, was overthrown in a coup.

With 80% of the count complete, Mr Hernández had won only 36% of the vote, well short of the clear majorities achieved by past presidents. Though the electoral tribunal declared him the winner, Xiomara Castro, the wife of Mr Zelaya, who won 29% under the banner of a new left-wing party, was refusing to recognise Mr Her-

nández's victory. The couple called on her supporters to take to the streets to protest "fraud". (As yet, they have only come out in dribs and drabs.) The Liberals were pushed into third, with about 20%. It is not clear which, if any, of the opposition forces might join a pact that Mr Hernández hopes to forge to overcome his party's minority in the 128-seat Congress.

Despite these impending difficulties in what is one of Latin America's poorest countries, some outsiders put a positive spin on the election. An American official said a higher turnout (about 60%) showed Hondurans' faith in democracy, which was "a beautiful thing". Feared post-electoral unrest, which prompted some panic-buying in supermarkets before the election, did not materialise. Despite the claims of fraud, observers from the European Union said the result tallied closely with exit polls. "I'm basically optimistic that with the new government there's a new start," the American official said.

Mr Hernández has pledged to make that start straight away. He hopes to renew a standby facility with the IMF within six months. International finance officials say that to do so he needs to cut a budget deficit that is expected to reach 7% this year, by raising electricity tariffs and eliminating hundreds of VAT exemptions. Since the new legislature will be splintered, the National Party may try to ram these unpopular measures through the outgoing Con-

gress, in which it has a majority.

Damming the flood of red ink is vital if the next government is to find the money for what most Hondurans think should be its top priority: tackling violent crime. At polling stations, voter after voter complained of the collapse in law and order, especially what a young engineer, Juan Roberto Antúnez, called a "war tax"—the charging of protection money by gang members who kill those who don't pay.

Analysts say one of the reasons Mr Hernández eventually overcame Ms Castro's early lead in the opinion polls was his promise to do "whatever it takes" to improve law and order. The creation this year of a 2,000-strong military police, which he says he will increase to 5,000, appears to have gone down well with voters, though the shape and scope of that force is still unclear. Ms Castro was the only candidate to favour civilian policing.

Oscar Álvarez, Mr Hernández's campaign manager who hints that he may lead a new super-ministry in charge of both the police and the army, says the *mano dura* ("iron first") approach will be leavened with crime-prevention measures aimed at discouraging youths from joining gangs, with money from the United States and know-how from Colombia. Mr Hernández insists only drug traffickers need fear the military police (though this claim rang hollow when dozens of them were deployed to deter Ms Castro's supporters the day after the election).

In the past four years *mano dura* from the National Party has failed to rein in organised crime and drug-trafficking. According to the EU observers, the party vastly outspent its rivals in the campaign. It is not clear where the extra money came from. As well as calming a divided country, Mr Hernández will have to ensure that his own house is clean too. ■

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Argentina's YPF

Swallowed pride

BUENOS AIRES

A deal with Repsol is a small step towards reversing an energy deficit

HAVING been an exporter of hydrocarbons not long ago, Argentina now imports natural gas from Bolivia and oil from Venezuela—even though it is sitting on what is probably one of the world's biggest shale oil-and-gas fields, Vaca Muerta in Patagonia. When President Cristina Fernández last year ordered the expropriation of Repsol's controlling stake in YPF, the country's main oil company, she saw this as a way of ensuring Vaca Muerta would be developed by Argentines, not Spaniards. But the nationalisation placed YPF at the centre of an international legal dispute.

This left Miguel Galuccio, YPF's new CEO, running a company with little chance of raising the capital it needs if it is to develop its slice of more than a third of Vaca Muerta's acreage. And it is one of several problems making it hard for Argentina to cut an energy deficit that according to Miguel Kiguel, an economist, is heading for \$7 billion this year. That deficit is a big reason behind a plunge in the Central Bank's reserves to a seven-year low.

All this explains why the government this week offered Repsol compensation, reportedly of \$5 billion, payable in government bonds. That is hardly generous: Repsol wanted \$10.5 billion in cash. Nevertheless, Repsol's board gave the offer a cautious welcome; the alternative is years of international arbitration.

For Argentina to become self-sufficient again in energy by 2030 requires investment of around \$200 billion, of which \$140 billion is in shale and about \$60 billion in conventional oil and gas, reckons Jorge Ferioli of the local branch of the World Energy Council, a pressure group. A

Infrastructure in Brazil

Taking off at last

SÃO PAULO

Some serious private money for airports and roads

ALTHOUGH not a fan of privatisation, since she became Brazil's president Dilma Rousseff has accepted that the state alone cannot fix Brazil's long-neglected infrastructure. Hitherto her government has talked much of bringing in private capital to do the job, but fluffed this in practice.

At last that is changing. On November 22nd Singapore's Changi Airport Group and Odebrecht, a Brazilian construction firm, offered 19 billion reais (\$8.2 billion)—four times the minimum allowable bid—to upgrade and run Galeão airport in Rio de Janeiro. The hub airport at Belo Horizonte, Brazil's third city, went to Swiss and German operators in partnership with CCR, a toll-road operator. And on November 27th Odebrecht beat six other bidders to win the right to upgrade and levy tolls on an 851km (530 miles) stretch of potholed road from the soya producing state of Mato Grosso.

Rapid growth in air travel and mismanagement by Infraero, the state operator, have overwhelmed Brazil's airports. Lax rules saw inexperienced firms win

three airports auctioned last year, including São Paulo's international hub. That disappointed the government, which tightened requirements for the latest round. But work on all three has since gone well, with clean toilets, new signage and extra parking already in place. At São Paulo a new terminal will open before next June's football World Cup. Quick fixes are all Rio and Belo Horizonte will be able to manage before the tournament. In the long term, though, the airports' classy new operators should mean a leap in quality.

Last year Ms Rousseff promised to hand ports, roads and railways to private operators in deals officials hoped would be worth 187 billion reais. But over-optimistic forecasts of future traffic and an unwillingness to offer attractive rates of return meant the programme stalled. Port and railway auctions still look dicey: in both cases regulatory muddle means a high chance of lengthy court battles and construction hold-ups. But some relief is finally in sight for long-suffering users of Brazil's airports and roads.

deal with Repsol improves Mr Galuccio's chances of getting other investors to follow Chevron, which in July agreed to invest a modest \$1.24 billion over five years in a pilot scheme in Vaca Muerta.

But only a bit. Under Mr Galuccio, an experienced oilman, YPF's investment spending has doubled this year, but only to about \$5 billion. A big obstacle to going faster is that Argentina's dispute with holders of defaulted sovereign bonds limits YPF's ability to tap international financing on reasonable terms.

The government has taken some steps to attract investment. It has raised the well-head price it pays for newly developed gas, approved a new hydrocarbons law and issued a decree allowing companies to repatriate profits after investing at least \$1 billion over five years. But drawing in more investment means allowing multinationals to import equipment, export production and repatriate profits freely, according to a senior industry source in Buenos Aires. It doesn't help that the official exchange rate is 60% overvalued, which makes it unattractive to bring in dollars.

"To get money you need to be trusted," the source says. Grudging though the deal looks, compensating Repsol is at least a first step towards restoring investors' confidence in Argentina. But it is only one of many that are still needed. ■

Peru's government

Partners in crime

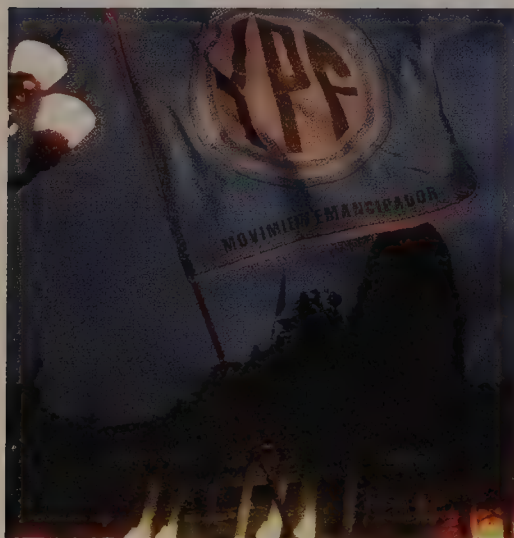
LIMA

A spy casts a shadow on the president

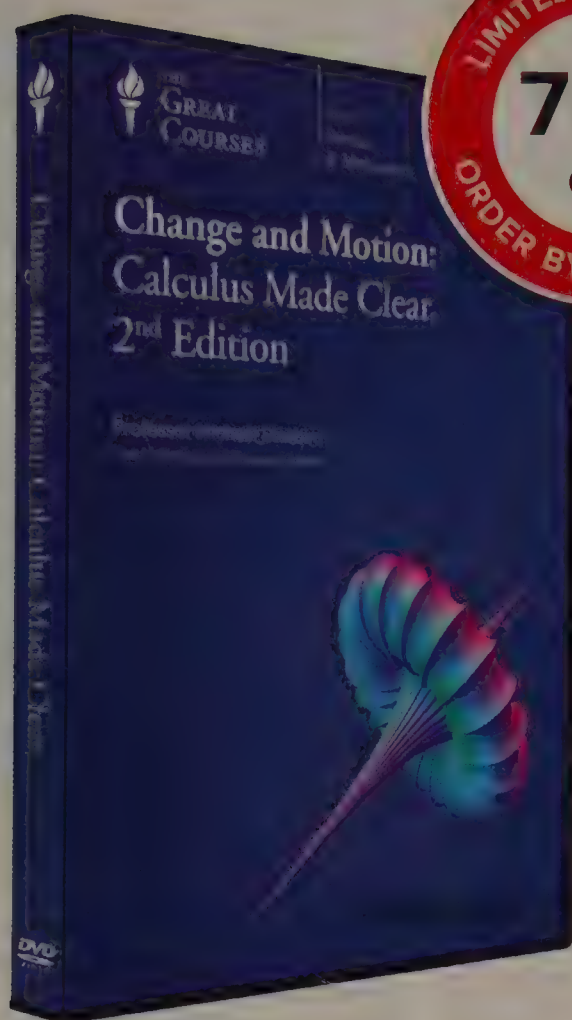
WHY were up to ten police patrol cars and dozens of officers providing round-the-clock protection at a house belonging to a convicted criminal? That is a question to which Peru's president, Ollanta Humala, has so far been unable to provide a coherent answer. And it is one that threatens further damage to Mr Humala's deteriorating reputation.

The criminal in question is Óscar López Meneses, who was given a suspended prison sentence for helping to run a vast espionage, extortion and embezzlement racket in the 1990s for Vladimiro Montesinos. The intelligence chief under the authoritarian government of Alberto Fujimori, Mr Montesinos is now serving a 25-year prison sentence. When a television programme revealed Mr López's continuing ties to the police earlier this month, the interior minister, Wilfredo Pedraza, resigned and seven senior policemen were sacked.

The scandal has lapped uncomfortably ►►



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close to Mr Humala, a former army officer. According to several security experts in Lima, Mr Pedraza was a largely decorative figure. The ministry was in practice run by Adrián Villafuerte, a retired colonel who served in the army with Mr Humala and acted as his security adviser. Mr Villafuerte, too, was sacked this month, despite his denial of any link to Mr López.

The president has announced an investigation into "corrupt police officers" whom he blames for the protection afforded Mr López. The affair has fuelled opposition claims that, like that of Mr Fujimori (who is imprisoned for human-rights abuses), his administration runs a parallel intelligence service for political purposes. Some Peruvians have long believed that the president himself had ties to the reptilian Mr Montesinos. When a lieutenant-colonel in 2000, Mr Humala staged a bizarre rebellion which distracted national attention just when the former intelligence chief secretly fled the country on a yacht. But some opposition parties also seem to have had past dealings with Mr López.

In addition, the scandal has served to remind Peruvians of the government's

poor record in fighting crime, which polls show is their main concern. Although Mr Humala pledged to make the issue a priority, crime has risen steadily on his watch. More than 40% of Peruvians reported being a victim of crime in the first six months of this year, according to the national statistics institute. Crimes reported to the police rose by 25% last year to a record level.

Three-quarters of those asked by Ipsos, a pollster, said they have no trust in the police (the judiciary is held in even poorer regard). In October Mr Humala appointed a new cabinet chief, César Villanueva, who says his main job will be to improve security. Doing so has to start with radical reform of the police, last attempted a decade ago. But will Mr Humala let Mr Villanueva do the job?

The president is widely credited for having left his predecessors' successful free-market economic policies in place. But largely because of his failures on policing and security, his approval rating has plunged to just 27%, according to Ipsos. Peru is a hard country to govern. But by relying on a coterie of palace advisers Mr Humala has not made his job any easier. ■

cho have all been taken out of his hands. In July the 52nd Jungle Infantry showed up to snatch a state agency for children, but a crowd of the governor's supporters forced a retreat. Four local radio stations, including one run by the state government, have been closed down and had their equipment seized.

Amazonas has many problems, but those most cited by local people are mainly the responsibility of central government. Frequent and lengthy power-cuts, unpunished violent crime, a precarious air link with Caracas and an almost non-existent internet service are among them. Outside Puerto Ayacucho, in the jungle that extends almost unbroken to the Brazilian border, an even darker mood prevails in the scattered Amerindian villages. Illegal mining is destroying the forest and polluting the water. The armed forces, whose duties include environmental protection, are accused by the Amerindians of complicity with the illegal miners and with the guerrillas of Colombia's FARC, who have shifted their camps to Venezuela to evade military pressure at home.

"The guerrillas ordered the villagers not to go out at night," says Uriel Blanco of OPIJKA, an organisation that defends the rights of the Jivi tribe. In the early hours, community leaders claim, boats laden with fuel and food head upriver to guerrilla camps. Neither these boats nor the miners seem to have problems with checkpoints run by Mr Maduro's National Guard. But the guard seizes game from Amerindian hunters, as well as any fuel or processed food for which they lack receipts. The state's Catholic bishop, José Angel Divasson, says that for the FARC, Amazonas is more than just a refuge: "It's clear that they are trafficking drugs. Why else would they need 500-metre airstrips? The light planes go over [to Colombia] with guns and they come back with drugs."

The cocaine business, along with illegal mining of gold and coltan, a mineral used in the manufacture of electronic devices, creates an almost insatiable demand for petrol and diesel, which are heavily subsidised by the Venezuelan government. The official price of a 200-gallon drum of petrol is just 14 bolívares. But once it leaves the river-port of Samariapo, it sells for at least 2,000 bolívares on the black market. By the time it gets to San Carlos de Río Negro, near the Brazilian border, it can cost five times that. Permits to buy fuel are controlled by the army.

"We get diesel for our generator once a month," says a villager. "That gives us six hours of electricity." Shops on the Colombian side of the river are well-stocked with subsidised Venezuelan food, while the people for whom it was intended go hungry. Amerindian groups have demanded a meeting with the president, but there has been no reply. ■

Venezuela's Amazonas state

Lawless rivers and forests

PUERTO AYACUCHO

The difficulty of being an opposition governor

THE gaudily painted perimeter wall of the army barracks in Puerto Ayacucho, the capital of Amazonas state, leaves no doubt as to the political sympathies of its commanding general. "The 52nd Jungle Infantry Brigade is Chavista Too", it proclaims, in defiance of constitutional strictures about military neutrality. The slogan—a reference to Venezuela's late president Hugo Chávez and the regime he founded—is a daily slap in the face for the state governor, Liborio Guarulla.

Chávez's successor as president, Nicolás Maduro, has waged a campaign to throttle the administration of Mr Guarulla, one of just three opposition governors across the country's 23 states. It is a foretaste of what the opposition can expect if it triumphs in mayoral elections on December 8th—which have turned into an unofficial plebiscite on Mr Maduro's shambolic and increasingly authoritarian rule.

He claims that Amazonas is in a "critical" condition because of the negligence of the state authorities. He has set up a parallel administration under Nicia Maldonado, a former minister for indigenous affairs, who was trounced by Mr Guarulla in an election last December. Ms Maldonado,



the governor's people say, has a budget bigger than his. Venezuelan states depend almost entirely on the centre for their revenues; there is little to stop the president employing creative accounting and delays in disbursements to make the governor look bad.

The result is that Mr Guarulla says he owes around 200m bolívares (over \$30m at the official exchange rate) in salaries. The state police, the airport, a newly built hospital and the main hotel in Puerto Ayacu-



The East China Sea

Regional turbulence

BEIJING, SEOUL AND TOKYO

China escalates a dispute, angering Japan and unnerving its neighbours

IT CAME out of a clear blue sky. On November 23rd China declared a huge swathe of mainly international airspace above the East China Sea to be part of a new Chinese “Air Defence Identification Zone”, or ADIZ: all aircraft intending to enter the zone had to file flight plans with the Chinese authorities, maintain radio communications and follow the instructions of Chinese controllers—or face “defensive emergency measures”.

Japan’s two main airlines rushed to comply with the new rules. But then it was America’s turn to surprise, with two B-52 bombers sent over the Senkaku islands inside the zone on November 26th, on what was claimed to be a regular exercise. They had, the Pentagon said, followed “normal procedures”, that is, “not filing flight plans, not radioing ahead and not registering our [radio] frequencies”. Suddenly a stand-off loomed between the world’s superpower and Asia’s emerging great power.

China insists its air-defence zone is nothing unusual. America and Japan, among others, have had them since the early days of the cold war, when countries were anxious about Soviet incursions. Yet America only insists that aircraft identify themselves if meaning to enter its airspace; planes simply passing through the zone (which extends well beyond territorial limits) do not have to. China insists all aircraft in its ADIZ abide by the new rules.

More provocatively, China’s ADIZ cov-



ers the uninhabited Senkaku islands, which China calls the Diaoyu. Japan has held these since the late 19th century, but since the 1970s China has also claimed them. Last year the Japanese government bought from their private owner three of the five islands it did not own. China saw this as a provocation and set out to undermine Japan’s control of the islands through incursions of surveillance vessels and, later, patrol aircraft—to which Japan responded by scrambling fighter jets. Recently an unmanned Chinese drone flew over the is-

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lands. When Japan threatened to shoot down the next one, a Chinese general said that would be an act of war.

The latest move represents a significant ratcheting-up of China’s challenge to Japanese control of the Senkakus. The new zone increases the risk of military escalation, accidental or otherwise. In future China may think that the zone forms grounds on which to take action against Japanese aircraft operating within the perimeter. Not only does the ADIZ cover Japanese-held territory, it also overlaps significantly with Japan’s own zone (see map).

Meanwhile, by running close to both Taiwan (which also claims the Senkakus) and South Korea, it has alarmed those neighbours too. An adviser to Shinzo Abe, the Japanese prime minister, calls it a “whole new game” and the biggest challenge in recent memory to freedom of movement in or above the East China Sea. Japan lodged a strong protest, which was rebuffed. Australia, South Korea and Taiwan have also expressed concerns. Chuck Hagel, America’s defence secretary, said China’s move was a “destabilising attempt to alter the status quo in the region”.

The decision to respond with an overflight of the B-52s, the Japanese insist, was a joint understanding. China, meanwhile, says that it monitored the (unarmed) bombers, but claimed that they flew only along the “eastern edge” of its zone. That claim may be a way of saving face at home. And on November 27th a spokesman appeared to back-pedal by claiming China would respond in the zone according to the perceived threat. Now South Korean and Japanese aircraft have defied its rules. Yet nothing suggests China is having second thoughts about its new ADIZ. Shi Yinhong of Renmin University in Beijing says it marks China’s first action since 1949 that “substantially expands its strategic space” ►►

▶ on the western rim of the Pacific. Countries in South-East Asia with which China has maritime disputes wonder whether China will now impose an ADIZ over the South China Sea in a bid to turn it into a Chinese lake too (see *Banyan*).

For now, China's move throws into question the depth of President Xi Jinping's desire for a "new type of great power relationship" with America. Barack Obama seemed to get on well with Mr Xi when they met for a two-day personal summit in June; he cannot have envisaged having to dispatch two bombers as a warning six months later. A better sense of how the two countries intend to handle matters will come with a visit to China in early December by the vice-president, Joe Biden.

Mr Shi admits that the zone has raised tensions, but predicts that Washington and Tokyo will want to avoid "too much risk of conflict"—ie, America and Japan will back off and accept the new situation. But that seems wishful thinking, as does a growing view among Chinese policymakers that

fear of conflict with China will push America to weaken its long-held commitment to underwrite Japan's security. In this view, America will urge Japan into an accommodation with China, first by acknowledging the existence of a territorial dispute.

Instead, it is now more likely that America and Japan will be more assertive. Bonnie Glaser of the Centre for Strategic and International Studies, a Washington think-tank, notes that flights such as the one taken by the B-52s this week are only the latest act in a long history of America's proving the freedom of navigation in international skies and waters. (And it seems to have reassured Japan's commercial airlines, which after lobbying by their government announced that they would not be following Chinese rules in future.) In Tokyo defence guidelines to be released at the end of the year appear likely to articulate a new policy of patrolling the seas and skies around the Senkaku islands constantly, rather than intermittently, as now. The stakes have just got higher. ■

Freedom of information in Japan

Secreted away

TOKYO

A conservative government passes a tough new secrecy law

ONE of the arguments against Japan's new secrecy law, which the lower house of the Diet passed on November 26th, came from the chief of a company helping to decommission the crippled Fukushima Dai-ichi nuclear power plant. Tighter control of information, said Yukiteru Naka, could frighten nuclear-plant workers into keeping quiet about safety risks. Strong objections also came from the public via the internet, from newspapers afraid of being muzzled and from freedom-of-information advocates.

None of this stopped the government passing the controversial law pretty much intact. Efforts have been made in the past to enact secrecy legislation, but until now the malign memory of the wartime secret police has blocked serious moves. As luck would have it for the ruling Liberal Democratic Party (LDP), the vote came just after China announced a new air-defence zone on November 23rd, highlighting how vital was Japan's national security.

Shinzo Abe, the prime minister, insists that the secrecy bill is an essential underpinning for a new national security council. The council is meant to centralise intelligence and speed decision-making among ministries. That Japan has no proper secrecy law, says Yosuke Isozaki, one of Mr Abe's aides, hampers intelligence-sharing

with friends. America in particular has long complained that Japanese officials leak information passed to them. It welcomes the new law.

Should the bill pass the upper house by December, as expected, a long list of ministries and agencies will be able to designate what counts as a state secret in three broad fields other than defence: diplomacy,

counter-espionage and counter-terrorism (the latter category would include information on nuclear plants). Japan currently treats leakers more leniently than other countries do. Only members of the Self-Defence Forces face tough sanctions, of five years in prison, for leaking defence secrets, or ten years for leaking information gleaned from Japan's security pact with America. Civil servants face a maximum of just one year in prison.

The new regime will raise that to ten years, and it will apply to senior politicians as well as bureaucrats. Journalists, too, would get up to five years for extracting secrets using "inappropriate" methods, such as buying information.

Threatened with such sanctions, Japan's usually tame news media have gone on the attack. The Nihon Shinbun Kyokai, a press lobby, warns that the government and bureaucrats may use the law to hide inconvenient information—an honourable Japanese tradition. The press is likely to stop asking hard questions, and bureaucrats may stop talking entirely, some say. The overall result, says Yoshioka Shinobu, director of the Japan PEN club, which defends writers' rights, is that the public will have less information. In particular, he says, anti-nuclear campaigns could in future be constrained.

Some concessions in the bill were expected. The government has agreed to restrict the period over which the majority of information remains off-limits, to 60 years rather than for ever. But elsewhere critics failed to get their way. An independent review board was proposed to decide what should be made secret and what should stay in the public domain. In the end, with a comfortable majority in the lower house and a weak opposition, an illiberal government was able to keep the bill largely intact. As it stands, the law currently pledges only to consider establishing an oversight body.

One natural restraint on the new regime, argues Yasuo Hasebe, a constitutional scholar at the University of Tokyo, is that if ministries lock away too much information, the government will function less effectively. The government also claims that the scope of undisclosed material will not expand, since most state secrets will be chosen from material that is already confidential. Currently, says Mr Isozaki, ministries and agencies guard about 420,000 secrets. Between 300,000 and 400,000 of those will become state secrets, subject to the tough new penalties. There will be rules on what each ministry may designate as a state secret. But for many people, that will be scant reassurance. Until recently even the secrecy bill was itself highly secret. Last month, when the *Mainichi Shinbun* newspaper asked for details of the draft law, it was sent documents with the contents entirely blacked out. ■



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Protests in Thailand

Power grab

BANGKOK

In trying to overthrow the government, opposition protesters are overreaching

THE finance ministry in Bangkok is no longer a calm haven of fiduciary responsibility. Since being stormed by protesters on November 25th it has become the headquarters of a would-be revolution. Its leader, Suthep Thaugsuban, has held court there, surrounded by the accessories of Thai-style street protests: crates of bottled water, mounds of free food and endless stalls selling everything the dedicated protester might need, from hand clappers to plastic matting for sleeping on.

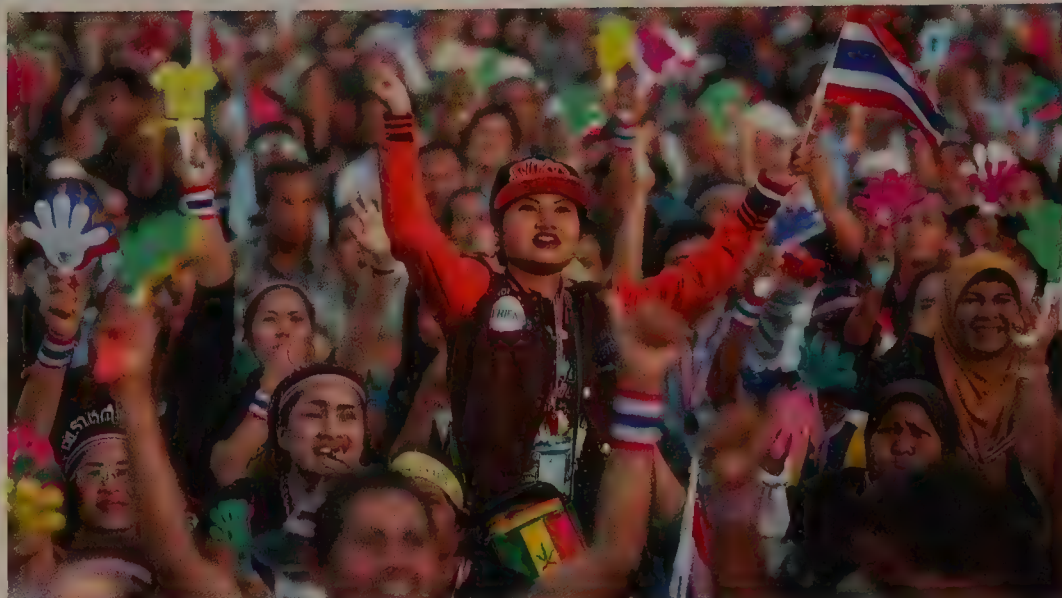
And lots of T-shirts. They are colour-coded to show that this is the Thai establishment on the streets rather than their erstwhile “red shirt” opponents, the supporters of the prime minister, Yingluck Shinawatra, and her government. Mr Suthep and his acolytes wear only black, to emphasise that they still mourn for the supreme patriarch of Thai Buddhism, who died recently, and yellow, the colour of the monarchy. Their dedication to these two institutions, many of them think, bestows moral force on a week-old explicit campaign to overthrow the government, elected with a big majority two years ago.

The spark for mass street demonstrations was the government’s cack-handed attempt to pass an amnesty bill. Though it would have pardoned many thousands involved in criminal and corruption cases over the past decade, it was specifically designed to benefit Ms Yingluck’s elder brother and a former prime minister, Thaksin Shinawatra, who faces a jail term for corruption if he returns to Thailand. Deposed in a coup in 2006, Mr Thaksin remains highly divisive.

The amnesty bill passed parliament’s lower house, where the Shinawatras’ Pheu Thai party holds a big majority. But it aroused such hostility from a swathe of people aghast at its sweeping nature that on November 11th the senate roundly rejected it.

Until recently Mr Suthep was an MP for the opposition Democrat Party, and he was once a deputy prime minister. He first took to the streets against the amnesty bill on November 4th, but then carried on protesting in his tented camp in the government district. Democrat Party supporters were bussed in from its southern heartlands. On November 24th the protest drew hundreds of thousands of people.

Mr Suthep’s intention in massing so many people in the heart of Bangkok was not immediately clear. But the following



No fans of the Shinawatras, they

day he was explicit: the aim now was to “uproot” the “Thaksin regime” using street power. He commanded his black shirts to seize government ministries. On November 27th they fanned out through the capital, surrounding another ten state offices. They even managed to empty the Department of Special Investigation, Thailand’s version of the FBI.

But just as the government overreached with the amnesty bill, so has Mr Suthep. Ms Yingluck alienated many red-shirt supporters because the amnesty bill would let off those responsible for ordering the shooting of scores of their comrades when they themselves were out on the streets, in 2010, against the (undemocratic) Democrat government of the time. Similarly, Mr Suthep has alienated many who opposed the amnesty bill but do not believe in ousting an elected government in a putsch.

Other Democrat Party leaders have studiously distanced themselves from Mr Suthep’s street tactics. They have also queried what his “people’s assembly”, the body that he suggests would replace Ms Yingluck’s government, might be. Mr Suthep is increasingly being viewed as an opportunist, and the number of people marching with him has fallen.

Meanwhile the government has played a weak hand well. Though Ms Yingluck lost moral authority over the amnesty bill, she has made up for it. Mindful of the bloodshed in 2010, she insists the police will never use force against the protesters. The courts have ordered the arrest of Mr Suthep, but so far no attempt has been made to seize him. There has been little violence. What is more, most of the key government offices, including the prime minister’s, are now safely sealed off by concrete barriers and razor wire. The barriers have already been dubbed “Bangkok’s Berlin Wall”, but the government continues to function, despite the fall of the finance ministry.

Ms Yingluck probably hopes that, so

long as she lets them roam around without doing serious damage, the protesters will run out of puff. King Bhumibol’s 86th birthday falls on December 5th, and the assumption is that most will be off the streets by then, out of reverence for him. On November 28th Ms Yingluck easily survived a no-confidence vote in parliament. Provided that the army does not intervene—which it shows no sign of doing—she might get through this turbulence. But not before the body-politic has been damaged by yet another spasm of street politics. ■

Pakistan’s armed forces

Out of the driving seat

ISLAMABAD

The prime minister wants to put the army in its place

IT IS said that the army chief is the most powerful man in Pakistan. Even so, the prime minister, Nawaz Sharif, made a point of keeping the new head waiting for as long as possible. Breaking with the convention that gives the new chief a month or two to prepare, Mr Sharif named a successor just two days before the outgoing chief, General Ashfaq Parvez Kayani, a former spymaster turned double-term army chief, was due to retire. Lieutenant General Raheel Sharif (no relation to the prime minister) will now control not only a vast army and the world’s fastest-growing nuclear arsenal, but a business empire ranging from cornflakes to luxury housing.

So why the delay? The prime minister is not always decisive, and bear in mind that the last time he picked an army chief, Pervez Musharraf in 1998, his appointee ousted him in a coup a year later. Others, however, suspect an attempt by Mr Sharif to assert civilian authority over an army ■

▶ that needs to be put in its place.

The army sees itself as both embodiment and guarantor of the nation. Yet it has long been at the root of Pakistan's deepest problems. By meddling in elections and mounting coups, it has weakened the political classes, whose consequent ineptitude and corruption gives it cause to meddle again. It has a history of disastrous military adventures. And it has made common cause with militant Islamists who it hoped would further its interests abroad—keeping India on edge to the south and sowing confusion in Afghanistan to the north in hopes of preventing anti-Pakistan forces growing there.

The country is now paying a terrible price for its sponsorship of foreign terror. It has spawned dozens of local extremist groups attacking Pakistan itself. Since 2001 nearly 50,000 Pakistanis have died in terror-related violence.

For a long time the generals refused to see the Islamists for the threat they are. Officers from the army's spy wing, Inter-Services Intelligence (ISI), were probably involved in funding and planning deadly attacks in Mumbai in 2008 carried out by Lashkar-e-Taiba. General Kayani may have been as bad as the rest. While he was rising to the top, the Afghan Taliban regrouped, the Mumbai attacks were planned, and Osama bin Laden settled in a garrison town.

Yet along the way the soldier-spy grew into the pragmatist committed to getting the army "out of the driving seat" and nurturing Pakistan's return to democracy. He and Mr Sharif seem to have got on, while the Americans respected him. Crucially, says Asad Munir, a retired ISI brigadier, he began to understand the nature of the existential threat posed by militant Islam. Military force is required to take it on, particularly in North Waziristan, a tribal area which an alphabet soup of al-Qaeda affiliates have made their base.

General Sharif's appointment was a surprise. But the good news is that he shares General Kayani's thinking on domestic militancy. In charge of army training, he was closely involved in efforts to retool an army trained for set-piece battles with India for counter-insurgency in the country's wild tribal west. Like General Kayani, he knows first-hand the futility of peace accords that militant groups soon renege on.

The problem is that the prime minister has yet to produce a national counter-terrorism strategy and says peace talks must be tried first. It is a cause with minimal chance of success, but one hotly promoted by much of the political establishment. Many more innocent lives may have to be lost before the politicians find the nerve for a military solution.

Elsewhere irritation with civilian government is already flowering among ju-



Nawat Sharif (left) and the quiet Kayani

nior officers. But there is no mood to take over. Mr Musharraf's eight years in power were a disaster (unlamented, he now awaits trial). The army's once-unchallenged authority has leached away to a set of rambunctious broadcast media, an activist supreme court and civilian politicians who this year successfully transferred power from one elected government to another—a first for Pakistan. Good governance is the best way for civilian rulers to keep the army off their backs.

Still, the army can always play a spoiling game, especially when it comes to relations with India. It makes no secret of despising Mr Sharif's enthusiasm for a rapid normalisation of relations, and opposes a crucial free-trade deal. And even as Mr Sharif dreams of visa-less travel across the Indo-Pakistani border, after years of relative calm the ceasefire line in contested Kashmir has become hot again. The officers probably deserve some of the blame for that. ■

New Zealand

Standing firm

CANTERBURY

The government resists pressure on two important fronts

THE New Zealand government, facing a general election next year, is confronting a referendum opposing asset sales and protests over drilling for oil. It is unlikely to be swayed by either. Government leaders say the sale of assets will contribute to returning the budget to surplus, and any oil discovery has the potential to transform the economy.

The referendum is being held because more than 10% of enrolled voters presented a petition to parliament calling for one, a provision made into law in 1993. The government is not bound by the result and it will take little heed of this one.

The referendum paper that New Zealand's 3m enrolled voters received on November 22nd asked whether they supported the government selling up to 49% of its shares in four energy companies and the national airline. The electricity companies have been state-owned enterprises, competing against one another, but the question may have appeared quixotic because the government has recently sold shares in two of the companies and reduced the government shareholding in Air New Zealand from 73% to 53%.

The prime minister, John Key, who is leader of the National Party that is the largest in the coalition government, pointed out that the referendum did not ask for the sales to be stopped but whether voters supported the sale. He argued that, because the sale of state assets was signalled in the National Party's 2011 election manifesto, New Zealanders had already voted on the issue and that the referendum was a waste of time and money.

The preliminary result of the postal referendum will be announced on December 13th. If the turnout is low or the vote against the sale of the assets is 20% or lower, the government will shrug it off. A 40% "no" vote might give it pause, but Bill English, the finance minister, has said there are no plans to sell any more state assets.

The government could not stop the referendum but it knew it would have a fight over drilling for offshore oil. That is partly because of the grounding of a cargo ship, the *Rena*, off a North Island beach in 2011, and a subsequent oil spill. So in April it passed legislation outlawing protests that interfere with or damage oil-exploration vessels. Protest vessels are not allowed within 500 metres of a ship or drilling platform. That has not stopped some protest ships from setting sail. Other demonstrators have gathered to protest on beaches around the country.

Petroleum is New Zealand's fourth-largest export after dairy goods, meat and wood. Oil and gas have been pumped from fields off the west coast of its North Island for many years without environmental incident. To the government, oil exploration by big oil and gas companies in New Zealand waters is the fulfilment of years of planning. Some say another large oil discovery could transform the economy. Other oil companies are showing interest in drilling offshore.

Political opposition to it has been led by the Greens. Labour, motivated by environmental idealism and fear of losing support to the Greens, has accused the government of underplaying the risks of oil pollution. The National Party will have a fight at the polls next year but unless there is a severe oil spill, neither drilling nor asset sales are likely to top the agenda. That will be dominated, as in most elections, by more humdrum concerns. ■

Banyan | Crossing a line in the sky

What China's new air-defence zone over disputed islands says about its foreign policy



ACUTELY conscious that the emergence of new powers on the world stage has more often than not led to war, China's leaders make much of their plans for a "peaceful rise". But they often have an odd way of showing it. Take China's declaration on November 23rd of an Air Defence Identification Zone (ADIZ) above a stretch of the East China Sea that includes the Senkaku or Diaoyu islands, which it disputes with Japan. This was bound to create alarm in China's own neighbourhood and tension in its relations with the incumbent superpower. So it calls into question the priority China really places on maintaining peace; or, perhaps, its skill in managing its rise without sparking conflict.

The declaration seemed contrary to at least three stated foreign-policy aims. First, China claims to aspire to a "new type of great-power relationship" with America. But the invocation of an ADIZ—elsewhere in the world a relic of the cold war—was almost bound to prompt some old-fashioned muscle-flexing in response. America quickly reaffirmed that, although it takes no position on who owns the islands, they are covered by its mutual-defence treaty with Japan. Nor did it take America long to test the threat contained in the ADIZ declaration of unspecified measures against aircraft entering the zone without following its procedures. On November 26th two American B-52 bombers based in Guam crossed the new zone without informing China. An American aircraft-carrier group was already in the area, ready for a joint exercise with Japan, simulating a defence of the country from attack.

All this came just ahead of a planned visit to China, Japan and South Korea in early December by America's vice-president, Joe Biden, intended to reassure both China and America's allies about America's strategic "pivot" to Asia. Mr Biden is said to have a good rapport with Xi Jinping, China's leader. Just as well.

Second, the ADIZ has done great damage to China's fairly successful recent efforts to reassure its neighbours of the benevolence of its intentions. China and South Korea, for example, have been getting on well lately—helped in part by shared resentment of what they see as Japan's refusal to confront the evils of its wartime past, and its intractability over territorial disputes. Yet the ADIZ, which also encroaches on areas claimed by South Korea, prompted the government in Seoul to express regret too. And it

created a bone of contention with Taiwan, with which relations have steadily improved in recent years.

Both Mr Xi and Li Keqiang, the prime minister, made well-received tours in South-East Asia in October, drawing attention to their reliable presence at a time when Barack Obama had cancelled a trip. China's importance as an economic partner overshadowed the disputes it has with four regional countries over the South China Sea. But the ADIZ to the north suggests it is only a matter of time before China feels able to enforce one there as well. That China's new aircraft-carrier and other warships were this week headed for exercises in the South China Sea was a reminder that China claims almost the entire sea and is ready to bully rivals—notably, of late, the Philippines—that stand up to it.

Third, and most broadly, the assertiveness over the specks in the East China Sea makes a mockery of the 35-year-old policy adopted by Deng Xiaoping of "strategic patience" or "hiding one's brilliance"—which implied concentrating on developing the economy before throwing China's weight around. Yet more than ever, China needs a stable global environment. A Communist Party central-committee meeting earlier in November promised a series of ambitious but high-risk economic reforms.

So it is possible that the announcement of the ADIZ was a blunder, an ill-considered overreaction to Japan's threat to shoot down unmanned aircraft entering its airspace. Chinese foreign policy has sometimes seemed unco-ordinated and oddly insensitive to the consequences of assertive nationalism. But in this case all the relevant arms of party and government were surely on board. And at the party meeting, Mr Xi seemed to have consolidated his own power over decision-making with the announcement of a new national-security council to take charge of the management of internal and external threats. Even so, China may have miscalculated in some ways: in including South Korean-claimed airspace, for example, or in including aircraft not just approaching China, but merely crossing its ADIZ; or perhaps in thinking that such a zone was enforceable at all.

Yet the ADIZ dovetails with China's long-term strategy for the islands. Since Japan's government "nationalised" three of them (buying them from a private owner) in September 2012, China has stepped up incursions in the sea and air around them. Having contested Japanese sovereignty over the islands for decades, it has set out to undermine Japan's claim to exercise administrative control. The ADIZ is a natural extension of this.

On the way up

The aim is to cow Japan, knowing that its government is under pressure from business to improve ties with the country's biggest market, and believing that, as China rises inexorably, Japan is in long-term decline. China also hopes, some Chinese scholars suggest, to raise the diplomatic and military cost to America of its alliance with Japan, partly by provoking Japan into belligerence of its own. Then America might exert pressure on its ally to meet China's demand, which is deceptively reasonable: for Japan to concede that the status of the islands is disputed.

An even more fundamental explanation of China's apparently reckless behaviour is that nothing in its commitment to a peaceful rise is meant to trump the safeguarding of its national sovereignty. Mr Xi emerged from the party's meeting appearing all-powerful. But no Chinese leader can afford to look weak on an issue, such as the disputed islands, that China has framed as one of its own sovereignty. He will find it hard to back down. ■



Social customs and inequality

Two weddings, two funerals, no fridge

POPU VILLAGE, GUIZHOU PROVINCE

Gift-giving in rural areas has got out of hand, further impoverishing China's poor

IT WAS a big week for Wang Wei. On a recent Wednesday she had two weddings to attend, then on Saturday, two funerals. Each involved a banquet, and by custom she was obliged to bring cash gifts. That was no hardship a decade ago, when the going rate for four banquets was the equivalent of \$5-10. And a decade before that, she would have just brought rice or corn from the family plot.

It is a hardship now. The cost of gift-giving in rural China has gone up much faster than incomes. This week Ms Wang's outlays added up to 350 yuan, or close to \$60—about a month's income. A pleasant, open-faced woman of 41, she says it is money she could have used to buy basic appliances. A water heater would be nice, she says, so her husband, in-laws and two teenage children wouldn't have to boil water to bathe. A fridge would be splendid. But these are extravagances. Giving gifts for big occasions is an inescapable, and increasingly onerous, obligation for hundreds of millions of China's farmers.

Much attention has been paid recently to gift-giving in urban China. In the past year the Communist Party under Xi Jinping has cracked down on excessive official banqueting. Such unseemly displays of consumption are well-known opportunities for bribery. But the banqueting culture in rural and small-town China is a more vexing problem. If officials' lavish parties are a symbol of social inequality,

they are not a significant cause of it. The gift-giving practices of everyday weddings (such as the one pictured above), funerals and milestone birthdays are doing much more to deepen actual inequality.

Exchanging gifts at such occasions has been a part of village life in China for centuries. The practice survived Mao's political campaigns and indeed took on more importance. Yunxiang Yan, an anthropologist at UCLA, observes that Mao's attacks on clans as bases of power broadened the network of gift-giving to friends and, in the post-Mao reform era, to *guanxi*, or connections, outside the village. As Chinese incomes rose, the widening networks for giving gifts—and the obligation never to give less than you last received—have fed a sharp upward spiral in gift amounts, a ruinous development for the poor.

An academic study of gift-giving in Guizhou, a poor south-western province, found that from 2005 to 2009 average gift amounts in three rural villages grew by 18-45% annually, compared with 10% annual income growth. The average share of income spent on gifts more than doubled—from 8% to 17%—while the share of income spent on food dropped, from 48% to 42%. One of the study's authors, Xi Chen of the Yale School of Public Health, concluded that this had a detrimental impact on antenatal health, as poor pregnant mothers cut back on food to keep pace with gift-giving.

The root of the problem is that the so-

cial model of rural gift-giving ignores income, and conforming is not simply a matter of saving face. The rural poor continue to give even when they cannot afford it, says Mr Yan, because of a powerful imperative of *renqing*, or personal feelings. Failure to fulfil the obligation of reciprocity, or to show consideration for others' feelings and emotional responses, is regarded as "an immoral act and thus a violation of *renqing* ethics," he says.

The burden imposed by *renqing* is a painfully public one, since the giving is done publicly. At a typical banquet guests line up to give cash at a reception table, where someone records the amount and the name of the guest in the family's gift ledger. No matter how little you earn, you are expected to give the prevailing amount. And if your *guanxi* with the host is close, you must give more, regardless of income.

The careful record-keeping system also puts pressure on people to match previous gifts, a dynamic that ensures the prevailing standard will only keep rising. Any factor that channels more income to some in a village but not all—migrant workers' remittances, a windfall from government compensation for using local land, or, as with some of Ms Wang's neighbours, from farming a cash crop like tobacco—increases the obligations for everyone. In Popu village, where the average annual income is less than \$1,000, close friends and relatives must give at least 100 yuan (\$16), compared with 10 or 20 yuan a decade ago.

There is not necessarily a benefit for those who host banquets either: the study on which Mr Chen worked found that banquet expenses have increased too. They can cost the hosts several times as much as they collect in gifts. Still, some banquets can be moneymakers, and in bigger towns there are more of them, with many more guests, than in the past: 80th birthdays, ►►

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▶ one-month birthdays for babies, parties for children going to college, housewarmings. (In the mountains of Hubei province, some farmers hold banquets when their pigs give birth.)

If Ms Wang wants to try earning her money back, she is out of luck for now, lacking an occasion. Her oldest son is 17, and sons are costly to marry off anyway: the bride's family expects a house in the bargain. She has not held a banquet since 2005—when her family moved into its new house—and the take was a pittance, a few hundred dollars before expenses.

She expects she will give more in gifts this year (perhaps \$1,000 in all) than she earns in income from odd jobs and farming her third of an acre of corn and rice, and that she will have to borrow to make up the difference. Attending banquets without giving is not an option, she says. Not attending is the only way to avoid giving. That is possible in big cities, where relations are more fragmented, but not in a village, says Ms Wang. The ties that bind more tightly can pinch more tightly too. ■

Steam locomotives

Rarer than pandas

SANDAOLING

Steam trains struggle on in the remote north-west

IN THE dust of the Gobi desert in China's far west, ultra-modernity sweeps past an eddy of industrial history in one of railway transportation's most remarkable close encounters. Hundreds of kilometres of track are being laid to connect the country's bullet-train network with Xinjiang, a region bordering on Central Asia. Near Sandaoling, a grim and remote mining town on the edge of Xinjiang, the new line runs close to the world's largest concentration of steam locomotives in active service.

The Sandaoling mine, which opened in 1970, is on a branch of the old railway line between Lanzhou and Urumqi. When the bullet trains start running, coal diggers in the area expect a boom; the plan is to dedicate the old line to freight, which should make transporting coal much cheaper. Every day Sandaoling uses steam locomotives to haul thousands of tonnes of coal out of the vast pit. Around 20 are still in use, far more than a trainspotter can expect to see at work in one place anywhere else.

Steam trains fell out of common use in America in the 1950s and in Britain a few years later. China had the last ones in the world on a main line until 2005. Coal being plentiful and labour cheap, small numbers of steam locomotives remain in industrial use. But Sandaoling is not for the casual day-tripper.

The economics of demolition

Creative destruction

HONG KONG

The frenzied pace of home demolition may slow

REPEAT visitors to China are impressed by two things. The skyscrapers, shopping centres and other landmarks of development that were not there before—and the many buildings there before that are not there any longer. Characterful neighbourhoods are torn down, quiet backstreets are lost forever and familiar roads are superseded by motorways. China's growing prosperity does not course through its society, it sweeps over it, obliterating evidence of an earlier, poorer era.

China keeps detailed statistics on the stuff it adds to the skyline. Last year it finished building 1.1 billion square metres of housing, equivalent to more than 10m

homes, according to Rosealea Yao and Thomas Gatley of GK Dragonomics, a research firm. But China does not publish figures on what it subtracts from the skyline. The Ministry of Housing and Urban-Rural Development has not released a figure for housing demolitions for nearly ten years.

Ms Yao and Mr Gatley have therefore arrived at an indirect estimate, using the national census. Last held in 2010, with a smaller version in 2005, the census includes a question asking when people's homes were built. The 2005 census revealed that 11.4 billion square metres of China's housing stock had been completed before the year 2000 (with another few billion added after that). Five years later, people said that only 9.55 billion square metres had been built before 2000 (with more than 7 billion added after that).

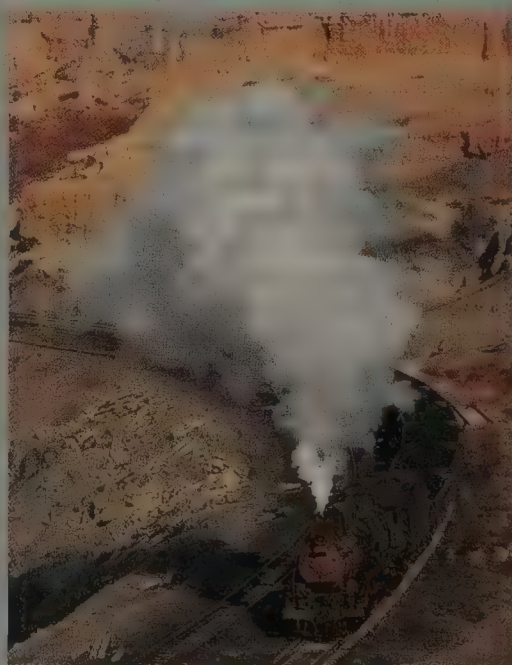
The two censuses show that a great deal of housing was built between 2005 and 2010. But a lot of housing was also unbuilt. Over five years, 1.85 billion square metres of 20th-century housing disappeared, more than 16% of the total.

Most of this demolished housing was built in the 1980s, when China's housing was mostly constructed by state-owned enterprises and allocated to employees by their work unit. These properties, which were often cramped and dingy, will not be missed. And yet even these demolitions illustrate an important truth about China's economy. Insofar as its restless activity is dedicated to destroying old things rather than building new ones, it is not adding to the country's wealth, properly defined. Traditional measurements of economic growth, which make no deductions for assets lost, fail to capture this nuance: wrecking crews are always good for GDP, though their impact is destructive.

Ms Yao thinks the frantic rate of demolition may slow in the years ahead. With so much 20th-century architecture destroyed, the country's remaining houses are relatively young, she points out. (Over 40% of them were built since 2000.) These buildings should, therefore, last many years before they need to be pulled down.

Governments are also proceeding more carefully with evictions. In the past most people did not appreciate the potential market value of the land they occupied; now they are better informed and less easily shunted aside. And China's new leadership has alluded to a less wasteful approach to urbanisation. In September Li Keqiang, China's prime minister, said that his approach was "humanity-centred". Zhang Xiaolang of the National Development and Reform Commission, China's planning agency, also said that urbanisation "does not mean simply building things or enclosing land".

The demolition dust needs to settle. Then perhaps China's new urban residents can do the same. ■



Chu chu

Remote and inhospitable, its locomotives are visited only by the determined (unlike Sichuan province's readily accessible pandas). One visitor, Roger Croston, a British enthusiast, says steam trains are threatened by a desire for modernity. In Sandaoling "the locals think we are mad", he says. "All they are interested in is the high-speed trains."

More photos at economist.com/blogs/analects

Technology Quarterly

November 30th 2013

Kill switch

Can technology make guns safer?




The venue that stole the show.

When the fans called for another encore,
the exits noticed and asked trains to wait.

The stadium activated backstage access
on the wristbands of the biggest fans.

And the band pushed a gift track to all
the phones that stayed through the finale.

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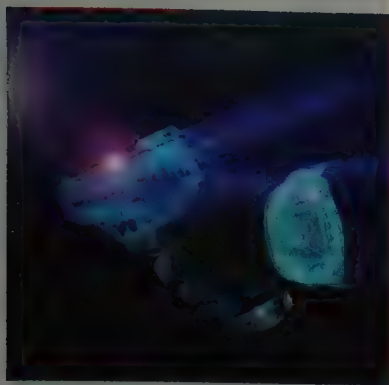
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Magnetic tape to the rescue

Information storage: A 60-year-old technology offers a solution to a modern problem—how to store all those bits and bytes cheaply and reliably

WHEN physicists switch on the Large Hadron Collider (LHC), between three and six gigabytes of data spew out of it every second. That is, admittedly, an extreme example. But the flow of data from smaller sources than CERN, the European particle-research organisation outside Geneva that runs the LHC, is also growing inexorably. At the moment it is doubling every two years. These data need to be stored. The need for mass storage is reviving a technology which, only a few years ago, seemed destined for the scrapheap: magnetic tape.

Tape is the oldest computer storage medium still in use. It was first put to work on a UNIVAC computer in 1951. But although tape sales have been falling since 2008 and dropped by 14% in 2012, according to the Santa Clara Consulting Group, tape's decline has now gone into reverse: sales grew by 1% in the last quarter of 2012 and a 3% rise is expected this year.

Alberto Pace, head of data and storage at CERN, says that tape has four advantages over hard disks for the long-term preservation of data. The first is speed. Although it takes about 40 seconds for an archive robot to select the right tape and put it in a reader, once it has loaded, extracting data from that tape is about four times as fast as reading from a hard disk.

The second advantage is reliability. When a tape snaps, it can be spliced back together. The loss is rarely more than a few

hundred megabytes—a bagatelle in information-technology circles. When a terabyte hard disk fails, by contrast, all the data on it may be lost. The consequence at CERN, specifically, is that a few hundred megabytes of its 100-petabyte tape repository are, on average, lost every year. Of the 50 petabytes of data held on hard disk, however, it loses a few hundred terabytes in the same period.

The third benefit of tapes is that they do not need power to preserve data held on them. Stopping a disk rotating by temporarily turning off the juice—a process called power cycling—increases the likelihood that it will fail. The fourth benefit is security. If a hacker with a grudge managed to break into CERN's data centre, he could delete all 50 petabytes of the disk-based data in minutes. To delete the same amount from the organisation's tapes would take years.

Tape has two other benefits, as Evangelos Eleftheriou, manager of storage technologies at IBM's research laboratory in Zurich, points out. It is cheaper than disks (a gigabyte of disk storage costs 10 cents, versus 4 cents for tape), and it lasts longer. Tapes can still be read reliably after three decades, against five years for disks.

Tape will never be the whole answer to storing data, according to Dr Eleftheriou. But it forms a crucial part of a "storage hierarchy". At the top of this are so-called hot data, those that need to be available

► for immediate access. These are best held in flash memory. Lukewarm data—those that people need to access frequently, but not instantaneously—are best stored on disks. Cold data, the stuff in long-term storage, can be recorded on tape. This cold store is by far the biggest repository. A report published in 2008 by Andrew Leung of the University of California, Santa Cruz, found that in general, 90% of an organisation's data becomes cold after a couple of months.

But even today's tape cartridges, which can hold up to six terabytes of compressed data, are not up to the job of dealing with the data deluge that is around the corner. Much higher densities than that are needed. In 2010 Dr Eleftheriou and his team, in collaboration with Fujifilm, set a new record. They demonstrated a tape that can store 29.5 gigabits per square inch—which, for a standard 1km tape, translates as 35 terabytes of data on a single cartridge. But even that is not enough for Dr Eleftheriou. He has now set himself the challenge of developing a tape with a density of 100 gigabits per square inch, and creating the equipment necessary to read it. If he is successful, a single cartridge will be able to store more than 100 terabytes.

The biggest challenge he and his colleagues face is not squeezing more barium-ferrite magnetic particles on to a tape in order to record more stuff; it is, rather, positioning the read/write head to within 10 nanometres in order to read what has been recorded back correctly when a tape is travelling under it at a speed of five metres a second. Even so, Dr Eleftheriou hopes to have a prototype ready in 2014. ■



summon help quickly. At any given daylight moment in America today, roughly 170,000 drivers are reckoned to be texting and 660,000 are holding a phone to an ear. Of America's more than 35,000 annual road deaths, a quarter are now linked to phone use, according to the National Safety Council, an NGO.

It is a similar story around the world. The slaughter on the roads is often more terrible in developing countries where people may be getting their first phone and their first car, says Etienne Krug, head of injury-prevention for the World Health Organisation (WHO). In India the deadliness of drivers using phones surpassed that of drunk-driving three years ago, says Harman Sidhu, head of ArriveSAFE, an Indian pressure group. Mobile-phone distraction, he reckons, accounts for nearly a fifth of the more than 230,000 annual fatalities which the WHO estimates now take place on India's roads.

More than 140 countries prohibit drivers from holding a handset to their ear. Some 30 or so also forbid the use of hands-free headsets. Most modern cars come equipped with hands-free systems to make and receive calls. Yet many studies show a deeper problem is the extra cognitive workload a driver takes on when talking to another person on the telephone. Texting is even worse and is widely banned at the wheel; texters are even more likely to kill someone or die in an accident. How can technology help keep drivers focused on the road?

Caller information is already displayed on a dashboard screen by the hands-free systems in some cars. It can also be shown in the "head-up display" of vehicles which project information, such as the car's speed, so that it appears to float beyond the windscreen. This can be less distracting because the driver does not need to adjust visual focus when looking between the road and a screen, says Sa-

chin Lawande, a technologist at Harman, an American company which makes audio equipment for homes and cars. Such displays can also respond to gestures, like a wave of the hand, to silence a call instead of looking down for a button.

Some worry, though, that the temptation to put more information into head-up displays could lead to drivers reading e-mails, scanning calendar appointments and so forth. Better, some say, to stick to voice commands. These can be used to operate a phone no matter where it is in the car, says Peter Mahoney of Nuance Communications, an American firm which makes voice-recognition software. However, in April a study funded by America's Department of Transportation found that speaking text messages could be as dangerous as typing them. (Nuance's software was not used in these tests.)

A number of companies think the best tactic is simply to disable drivers' phones. DriveScribe, an app for Android smartphones that is made by a company called Drive Power, sends out auto-replies that the driver is unavailable while a vehicle is in motion, and unblocks communications only when the vehicle stops. Mike Moen, the firm's boss, concedes that many drivers will not willingly give up access to their devices, but says some parents require their teenage children to install the app if they wish to drive. Cheaper car insurance might persuade more drivers to accept phone-disabling features.

Another app, TextLimit, disables the touchscreen on iPhone, Android and BlackBerry devices when the GPS in the device determines that it is moving at a preselected speed, says David Meers of Mobile Life Solutions, the app's developer, based in Atlanta. Aegis Mobility, a Canadian firm, is pursuing an alternative approach that would operate both within the phone and within the network: telecoms operators would not route calls or

Fatal distraction

Mobile phones: People who use their phones while driving are causing carnage on the roads. Can technology reduce phone-related accidents?

FOR motorists, mobile phones have been both a blessing and a curse. In 1995, when 34.5m Americans carried them, fatalities from road-traffic accidents began to fall—in part because accident victims and witnesses could immediately phone for help, says Peter Loeb, an economist at Rutgers University in New Jersey. Sadly, the trend reversed four years later. By 1999 there were 97.8m Americans touting phones, and in some cases calling and even texting while behind the wheel. The fatalities from accidents caused by drivers using phones began to outweigh the number of lives saved by the ability to

▶ data to devices on the move.

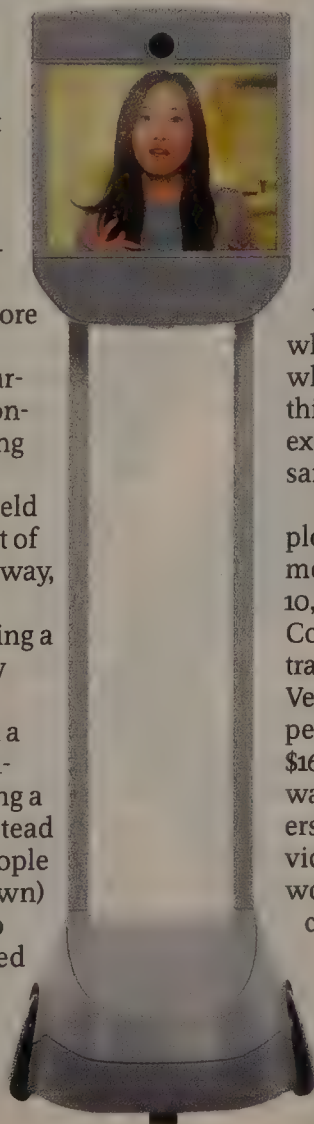
But what happens if you are the passenger in a car, or on a train, and you want to talk and text? Phones in moving vehicles could be unlocked if users pass a short test, suggests Andrea Henry of Iowa's Department of Transportation, which is planning to supply teenage drivers with Aegis Mobility's apps. Alternatively, signals around the driver's seat could be scrambled by a dashboard-based jammer such as the SkyBloc, made by Trinity-Noble, an American firm. It works well but may also block passengers' phones, says Eyal Adi, head of the firm's office in Ra'anana, Israel. Non-government use of such kit is also illegal in many jurisdictions (though a Panamanian shipping firm bought about 100 units). It seems there is no simple technological fix—unless, that is, self-driving cars become widespread, freeing drivers to use devices unhindered, and improving road safety all round. ■

Roboconf

Telepresence: What is it like to attend a conference remotely, via a robot proxy that provides video-conferencing on wheels?

SCI-FI writers have long imagined technologies that would allow you to manipulate and control a perfect replica of yourself in a distant location. Today's remote-presence robots are crude by comparison, amounting to little more than videoconferencing on wheels. But they can still be surprisingly nifty, as this correspondent discovered while pottering around RoboBusiness 2013, a robotics conference recently held in California, from the comfort of a desk 1,500 miles (2,500km) away, in Austin, Texas.

This was made possible using a Beam (pictured), developed by Sutable Technologies. It is a wheeled robot equipped with a camera, microphone and loud-speaker, and a screen displaying a live feed of its driver's face. Instead of appearing to "locals" (as people at the remote location are known) as an image on a static desktop monitor, you are thus embodied in a physical object 1.57 metres tall, weighing just under 50kg and with a top speed of 1.5 metres per second.



Two wide-angle video cameras (with zoom and pan controls) provide a 105-degree field of view. A downward-pointing camera shows the area around the base to help you avoid obstacles. You pilot the device using the arrow keys on a computer keyboard. It all feels like guiding a character in a slow-scrolling computer game, except that the character and the game world are not virtual, but real. Beam and its ilk are limited for now: they cannot manipulate objects at the other end except than by knocking into them (few sport grippers), they are confined to relatively smooth floor surfaces and they require a high-speed internet link. But that still allows them to work in plenty of situations. Attending RoboBusiness by Beam, it was possible to visit booths, chat with people and attend meetings. The audio and video were clear regardless of the hubbub on the conference floor—and when talking to people using other Beams.

Taking notes involved the use of old-fashioned pen and paper, because the Beam lacks a built-in recording capability. Scott Hassan, Sutable Technologies' boss, says the company decided against it, lest the robot be perceived as a surveillance device. But there is nothing to stop Beam users using separate devices or software to record audio. Accordingly, some people might prefer not to talk to what looks like a roving closed-circuit television camera.

Attendees at RoboBusiness reacted positively to the device, though a warm welcome was only to be expected from the sort of people that you find at a conference about robots. Conversations began and ended naturally, as they would in person, helped by the fact that you can point your Beam towards your remote interlocutor while talking, and turn away when you are finished. The only thing missing from the conference experience was the ability to sample free drinks.

Sutable Technologies deployed 50 Beams in this experiment. In 2015 it wants to have 10,000 of them roaming round the Consumer Electronics Show, a big trade event held each year in Las Vegas that is attended by 150,000 people. Beams currently sell for \$16,000 a pop, but the company wants to offer conference organisers the option of renting the devices to attendees at a price that would be competitive with the cost (flights, hotels, and so forth) of attending an event in person. That said, if Mr Hassan and robots have their way, the whole notion of "in person" may be need redefining. ■

Made in China

Technology and society: China has its own distinctive version of the maker movement, which spans electronics hobbyists and high-tech startups

IT IS a drizzly October day in Shanghai, and beneath a few dozen bright orange tents, set up in the plaza of a shiny new innovation park, hundreds of electronics hobbyists and entrepreneurs are attending China's second Maker Carnival. The "maker" movement, an offshoot of do-it-yourself culture whose adherents design and build their own technology products, is more established in America: the most recent Maker Faire New York, for example, held in September, boasted some 75,000 participants and over 650 stalls. But size isn't everything, even in China.

Under those orange tents some surprisingly innovative companies that supply hobbyists and startups were strutting their stuff. There were robot-construction sets, build-it-yourself electronics kits and 3D printers galore. None of the companies that make them is a familiar name yet. But some of them could one day challenge the likes of MakerBot, an American manufacturer of 3D printers, or Arduino, an open-source microcontroller platform invented in Italy, as the darlings of the worldwide maker movement.

What gives these young Chinese firms a potential edge is their close connections with the so-called *shanzhai* production networks centred on Shenzhen, China's high-tech manufacturing hub. The term *shanzhai* is often used pejoratively to refer to Chinese copycat producers of mobile phones and other electronic devices, based on copied designs and knock-off brand names. But its literal meaning is "mountain village", and it refers to bandits who opposed corrupt rulers and hid in the countryside—much like Robin Hood in English folklore. David Li, co-founder of XinCheJian, Shanghai's first "maker space" (essentially, an open-access workshop), says the Robin Hood spirit is inspiring legitimate and often quite innovative products, as the socially progressive maker movement teams up with hard-nosed manufacturers.

Seed Studio, a startup based in Shenzhen, is a good example. The company specialises in open-source hardware, which means the design of the hardware and the software code that goes with it are both freely shared. As the success of Arduino has demonstrated, open-source hardware is ideal for quick prototyping

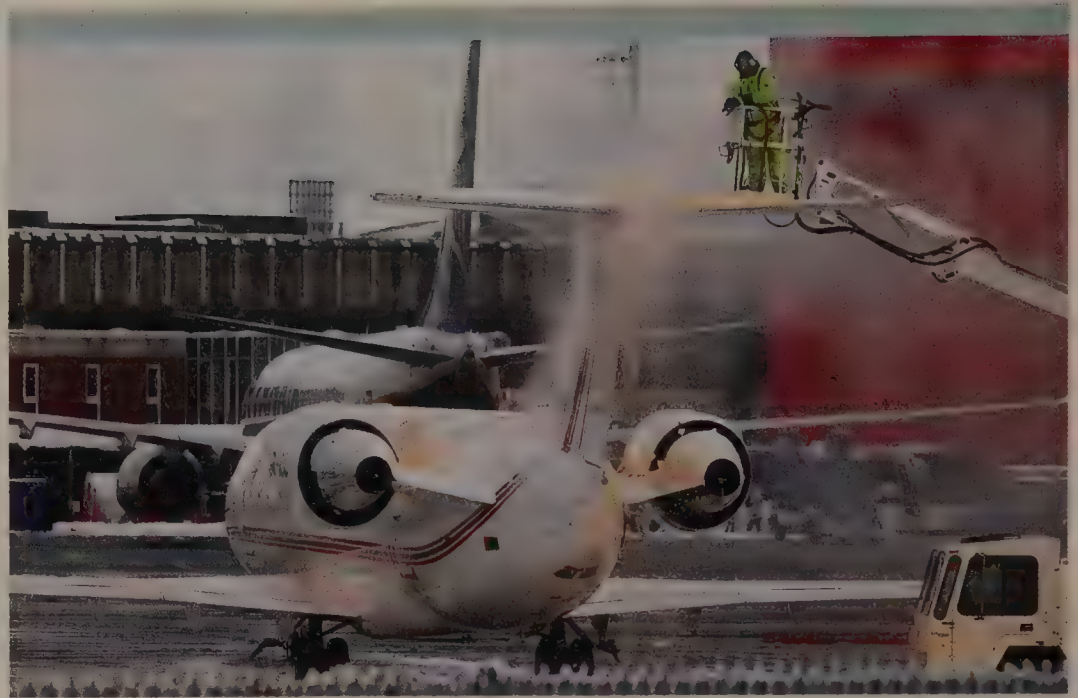
▶ and small-scale production runs of digital devices. But Seeed goes one step further, supporting a whole ecosystem of open-source production. People pitch ideas on its website, and if they garner enough community support, Seeed will manufacture them. More than 70,000 people are participating on its site, and over 130 projects were crowdsourced this way in 2012. Those numbers are expected to more than double in 2013.

Eric Pan, the founder of Seeed Studio, exemplifies a new breed of Chinese entrepreneur. He quit his tech-industry job in 2008 to start making hardware with a friend, based in his apartment (the urban Chinese equivalent of a garage). Now his company employs more than 100 people, and the unassuming Mr Pan is a rock-star among young Chinese geeks. Even so, he is quick to admit that not all Seeed Studio products are hits, and humble about the challenge of surviving as a business in an open-source world, where copying good ideas is not merely allowed but encouraged. Yet he is also bullish about the future: his firm is expanding its range of kit to include wearable electronics and new kinds of sensors.

Proximity to *shanzhai* manufacturers could make it easier for Chinese makers to turn prototypes into mass-produced products. At the same time, the maker community could boost innovation among *shanzhai* firms, which are in fact more inventive than is often assumed. Silvia Lindtner, an ethnographer at University of California, Irvine and Shanghai's Fudan University, notes that *shanzhai* producers have long adapted mobile phones to the needs of people in the developing world. For example, unlike mainstream manufacturers, they championed mobile phones with dual SIM slots, ideal for Africa and India where users often switch networks to reduce costs.

For their part, Chinese government officials are taking an interest in the maker movement because of its economic and educational potential. Shanghai's municipal government has backed a plan to build 100 maker spaces throughout the city. Four of these new spaces are already up and running, with several more to be completed by the end of the year. Each will have a 3D printer, and will also teach traditional crafts such as woodworking.

One of the attractions of maker spaces like XinCheJian, however, is that they operate independently of the state, supported by users' monthly membership fees. Although expats played a big role in initiating XinCheJian, more recent maker spaces such as Beijing's Maxpace and Shenzhen's Chaihuo were entirely home-grown. China's distinctive take on the maker movement—makers with Chinese characteristics, to paraphrase Deng Xiaoping—is worth keeping an eye on. ■



Sooty skies

Aviation: A novel coating made of nanotubes offers a faster and more convenient alternative to chemicals for de-icing planes

DE-ICING an aeroplane is tedious. Just ask any passenger stuck in one while ground staff spray it with gallons of anti-freeze. It is also important. Layers of ice can interfere with a wing's aerodynamics, increasing drag and reducing lift, with potentially catastrophic consequences—hence the chemicals' garish colours, meant to ensure that no nook or cranny is missed. De-icing can take as long as 40 minutes, and costs around \$2,000 a pop.

And sometimes, as Dawid Janas of Cambridge University found on a flight from his native Poland, it needs to be performed several times, because in harsh conditions the antifreeze itself can freeze if left to chill for long enough—as when awaiting the go-ahead for take-off. Now, though, Mr Janas, a materials scientist and aviation buff, thinks he has found a way to make life easier for passengers and airlines. It involves covering aircraft wings with a form of soot.

Not any old soot, mind you. Mr Janas creates his by pumping methane into a furnace heated to around 1,200°C. There, in the presence of an iron catalyst, the gas coalesces into a sticky substance akin to candyfloss, called an aerogel. When an iron poker is inserted into the furnace, the aerogel sticks to it. As the rod is retracted, it pulls out a thin filament, which is spun to create a film. Ten minutes later you get a sooty equivalent of an A4 piece of paper.

The film, about 10 microns thick, is composed of a mesh of carbon nanotubes, themselves just a few billionths of a

metre across. Individual nanotubes are, famously, better conductors of electricity than even copper. In Mr Janas's aerogel, however, they are no longer than 1mm each, with air in between them. That means the film, far from being a good conductor, exhibits high electrical resistance. Passing a current through it causes a near instantaneous rise in temperature.

Indeed, when Mr Janas compared his material with nichrome, the heating element of choice for applications from kettles to aeroplane wings (where it is used mainly for in-flight de-icing), he found that it heats up twice as fast using half as much energy as the metal alloy. It is also one ten-thousandth of the weight. The amount of film needed to cover the wings of a jumbo jet weighs just 80 grams.

Finally, whereas an A4 sheet of nichrome costs around \$12,000, its carbon-film equivalent could be had for a hundredth of the price; probably less when the process is commercialised, as Mr Janas hopes it will be. Once installed, the heaters would be so cheap to run that they could be left on continuously at low power, to stop ice forming in the first place. And they last. A piece tested by Mr Janas retained its properties after being folded and unfolded 100,000 times.

Already a number of industries, though not yet aircraft-makers, have expressed an interest in the material. But if aviation does take to the stuff, the upshot will be more soot in the air—but of an entirely welcome variety. ■

Particle physiology

Medical technology: Nanotechnology provides a way to detect potentially dangerous blood clots, without the need for tiny submarines

ONE of the dreams of nanotechnologists—those who try to engineer machines mere billionths of a metre across—is to build medical devices that can circulate in the bloodstream. This aspiration often prompts ridicule, frequently accompanied by a still from “Fantastic Voyage”, a film made in the 1960s about a team of doctors in a submarine that had been miniaturised with them inside it, so they could destroy a blood clot which threatened to kill a scientist who had been working behind the iron curtain.

Well, titter ye not. For although Sanjeeta Bhatia’s nanoscale devices are not really submarines, are certainly not crewed by Raquel Welch and do not actually destroy blood clots, they do go around the bloodstream finding such clots—and report back what they have found, so that destruction can take place if necessary.

Dr Bhatia is a bioengineer and physician at the Massachusetts Institute of Technology. She was impressed by the extraordinary sensitivity of modern urine testing, which can detect conditions ranging from diabetes and pregnancy to breast and brain cancer. But she noticed that one thing it cannot detect is clots attached to the walls of blood vessels. Nor is there an effective blood test for such clots.

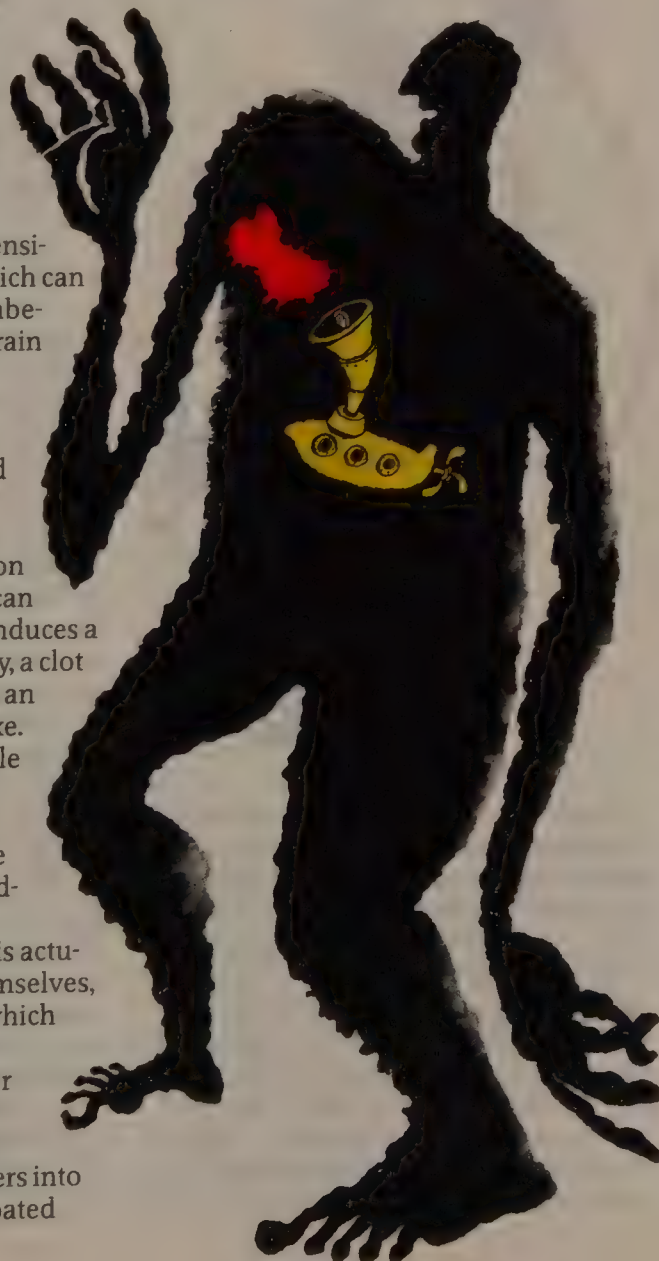
That matters, because if a clot breaks free from its site of formation and lodges somewhere critical, it can kill. A clot in the coronary artery induces a heart attack. In a pulmonary artery, a clot causes a pulmonary embolism; in an artery in the brain, it causes a stroke. Dr Bhatia thought she might be able to design something that detects and reports the presence of clots and, as she recently outlined in the journal *ACS Nano*, she has succeeded.

What Dr Bhatia’s clot-detector is actually detecting are not the clots themselves, but an enzyme called thrombin, which induces clotting and is thus an indicator of the presence of clots. Her “submarines” are tiny particles of iron oxide (though not so tiny that they pass through the kidney’s filters into the urine, and are lost). They are coated

with small fragments of protein, called peptides, specially chosen because they react with thrombin. That, however, is not enough—because there is no way to tell from the outside whether such a reaction has taken place. To manage this Dr Bhatia attached reporter chemicals to the free ends of the peptides. When a peptide binds to a thrombin molecule the reporter is released. And the reporter, unlike the iron-oxide particle, is small enough to pass into the urine, where it can be detected by a simple test.

When tried out in mice, this idea worked perfectly. The urine of animals with clots in their lungs turned orange when tested, as it was supposed to do. That of clot-free animals remained unchanged. As for the iron oxide particles, these slowly dissolve in the bloodstream in a way that should cause no damage.

No trials have yet been carried out on people. But if such tests work and the procedure proves safe, then it might be used to give early warning, in those thought at risk of developing internal clots, that such clots have indeed developed. They can then be attacked with clot-busting drugs before they can break away and do serious harm. ■



Clean that up

Environmental technology: A combination of two desalination techniques provides a new way to purify the water used in fracking

WATER injected at high pressure into rock deep underground during the process of hydraulic fracturing, or “fracking”, often returns to the surface as brine, having picked up a lot of salt on its journey. It is also contaminated with chemicals from the fracking process itself. So a cheap and effective way of separating the salt and other chemicals from the water would be welcome. General Electric (GE), an American engineering conglomerate, is now putting one through its paces.

The system in question, developed by a firm called Memsys Clearwater, which is based in Germany and Singapore, is called vacuum multi-effect membrane distillation. It combines the two established ways of desalinating water: distillation and membrane separation. Already used to produce drinking water from seawater, it has not previously been applied to cleaning up water used in fracking. But recent trials of the system at a gas-fracking plant in Texas have been encouraging.

The usual way of dealing with exhaust water from fracking is to transport it by road to a processing facility where it is put into giant steel evaporators. The water is boiled and clean water is condensed from the vapour; the residual brine is then reduced to salt by passive evaporation. But all that boiling requires a lot of energy. Membrane-based systems, which work by forcing water through what is, in effect, a molecular sieve, are less greedy. The holes in the sieve will allow water molecules to pass, but not sodium and chloride ions (the components of salt), because these electrically charged species are surrounded by retinues of water molecules that make them too big. If sufficient pressure is applied, in a process called reverse osmosis, clean water emerges on the other side of the membrane.

But reverse osmosis, though less energy-intensive than thermal evaporation, still requires a lot of energy, and can deal only with relatively low salinities, like that of seawater, which has a salt content of around 3.5%. Higher concentrations require more pressure, and the exhaust from fracking often has a salinity of 8-12%—too much for reverse osmosis to cope with.

Vacuum multi-effect membrane distillation tries to have the best of both worlds, by making the process of evap-

oration take place through a membrane. It also, as the name suggests, operates in a partial vacuum. This reduces the boiling point of water to 50-80°C which means less energy is needed.

The apparatus itself consists of a series of plastic cells, each of which has a condensing foil at the front and a membrane at the rear. Incoming liquid is heated and injected into the first cell. Some of it evaporates through the membrane at the rear and into a chamber, where it meets the condensing foil on the face of the second cell. This causes the water vapour to turn back into liquid, which is drained out and collected. The remaining brine in the first cell, now cooler and more concentrated,

continues into the second cell, where it is warmed by the heat gathered by the condensing foil on its face. As before, some of this brine evaporates through the rear membrane of the second cell and into the next chamber where it condenses on meeting the foil on the third cell.

The process is repeated, cell after cell. Eventually, only highly concentrated brine remains, which is cooled and taken away for disposal. The clean water drained from the chambers between the cells, meanwhile, is pure enough to be used for irrigation, or even as drinking water, according to Florian Bollen, one of Memsys's directors. Alternatively, it can be reinjected into the ground during the next frack. ■

Move over, Siri

Predictive intelligence: A new breed of personal-assistant software tries to anticipate what smartphone users want, before they ask for it

THE idea of artificially intelligent personal assistants—digital secretaries, made of software, that take dictation, manage contacts, book lunches and arrange transport—has been around for many years. But truly successful examples have proved as elusive as flying cars. Perhaps the best known example is Siri, the personal assistant built into Apple's iPhones and iPads, which can understand complex spoken sentences such as "Please reschedule tomorrow afternoon's meeting from 4pm to 3pm". As clever as this is, however, Siri still feels more like a technology demo than a really useful assistant.

The next generation of assistant software aims to go one step further by pursuing an approach known "predictive intelligence". It exploits the fact that smartphones now have access to fast internet links and location data, and can draw upon personal information, address books, e-mail and calendars. The aim of these new assistants is to anticipate what information users need, based on context and past behaviour, and to provide it before they have even asked for it. Such an assistant might, for example, spontaneously suggest that you leave early for a meeting, because it has spotted heavy traffic en route; present directions to your hotel when you arrive in a foreign country; offer to book a taxi or hotel based on analysis of an incoming e-mail or text message; or offer personalised suggestions for dinner in the evening.

"The phone has all of these data sources, and we are still the ones who pull out our phones and take the first step. Why does a human need to initiate this



process?" asks Bill Ferrell, the founder of Osito, a predictive-intelligence application for the iPhone. Instead, software should reduce the friction involved in performing tasks on mobile devices and reduce the need for manual input. Today's cumbersome interactions are, Mr Ferrell argues, an awkward transitional stage in the evolution of mobile devices that predictive intelligence will see off. With the advent of wearable devices that support fewer input methods, like smart watches and Google Glass, there will be a need for

less interaction and more automation.

Google, for its part, considers predictive intelligence to be the future of search. Its Google Now service is arguably the most advanced incarnation of predictive intelligence; installed in many millions of Android devices, it is certainly the most widespread. In recent years Google has improved its search engine through semantic analysis and, more recently, personalisation. Anticipating your need to search is a logical next step. It draws upon search history, stored personal data and past behaviour to provide "the right information at just the right time" in the form of cards that appear on a smartphone's screen. Google Now's algorithms can also take advantage of partnerships with third parties—including airlines and event organisers to access ticketing information. A new feature even allows Google Now-enabled devices to listen to the sound of your television, identify what you're watching and provide programme information in real time.

There are many other contenders. The Android and Apple app stores are filled with personal assistants of various kinds. Some draw primarily on calendar data (Donna, Sunrise, Tempo) and others on e-mail or location (Osito, reQall). Apple, which looked somewhat behind the curve on predictive intelligence, bought Cue, a personalised-agenda app, in October. It included some predictive features in the latest update to its mobile-device operating system, iOS 7, such as estimated journey times to frequently visited locations.

As ever more personal information becomes centralised in smartphones and the accuracy of positioning technology increases, these assistants will be able to learn new tricks. But innovators must tread carefully. For one thing, predictive intelligence can be creepy. Some people may not like the idea that their phone is tracking what they are doing so closely. It's also hard to get right: assistants will inevitably make mistaken predictions, leading to unwanted notifications. Many smartphone users are already struggling with "notification fatigue" as apps and online services compete for their attention.

"There's a balance between coverage and precision," says Baris Gultekin, one of the architects of Google Now. Predictive technologies rely on a technique called Bayesian inference to combine multiple signals and estimate the accuracy of a given prediction. Mr Gultekin says Google Now's notifications have to pass a "high bar" of both likelihood and usefulness in order to be displayed. It is tempting to push information to users based on a clever deduction, says Mr Ferrell, but it's better to be silent than wrong. Yet some users even complained that the first version of Osito did not pop up often enough. Who would have predicted that? ■



And the winners are...

Innovation awards: Our annual prizes recognise successful innovators in eight categories. Here are this year's winners

THIS newspaper was established in 1843 to take part in "a severe contest between intelligence, which presses forward, and an unworthy, timid ignorance obstructing our progress." One of the chief ways in which intelligence presses forward is through innovation, which is now recognised as one of the most important contributors to economic growth. Innovation, in turn, depends on the creative individuals who dream up new ideas and turn them into reality.

The Economist recognises these talented people through its annual Innovation awards, which are presented in eight fields: bioscience, computing and telecommunications, energy and the environment, social and economic innovation, process and service innovation, consumer products, a flexible "no boundaries" category, and the corporate use of innovation. The awards will be presented at a ceremony at BAFTA in London on December 3rd. And the winners are:

- **Bioscience:** **James Allison**, professor and chair of immunology at the M.D. Anderson Cancer Centre at the University of Texas, for the development of an "immune checkpoint blockade" **cancer therapy** which reactivates the body's defences in order to respond to a tumour that has evaded the immune system.
- **Computing and telecommunications:**

Steve Furber and **Sophie Wilson**, formerly of Acorn Computers, co-creators of the **power-efficient ARM processor** that powers most of the world's mobile phones. Its "reduced instruction set computing" design was intended to boost performance, but unexpectedly proved to be amazingly energy-efficient too.

- **Energy and the environment:** **Tim Bauer**, **Nathan Lorenz** and **Bryan Willson**, co-founders of Envirofit, for developing a **compact stove that reduces indoor pollution** by cutting smoke, toxic emissions, biomass consumption and cooking time compared with traditional designs. Envirofit has sold more than 650,000 stoves in more than 40 countries.

- **Social and economic innovation:** **Jane Chen**, **Rahul Panicker**, **Naganand Murty** and **Linus Liang** of Embrace, for developing a **low-cost incubator** to reduce neonatal deaths in the developing world. More than 20,000 babies in a dozen countries have benefited from its design, similar to a sleeping bag (see photo).

- **Process and service innovation:** **Salman Khan**, founder of Khan Academy, for creating a **free online-education platform** that now serves more than 10m students each month and has delivered more than 300m lessons.

- **Consumer products:** **Chuck Hull** of 3D Systems and **Bre Pettis** of MakerBot for

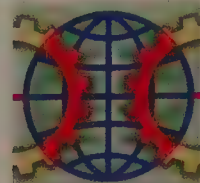
pioneering and popularising 3D printing. Mr Hull, who invented a process called stereolithography in the 1980s, is considered the father of 3D printing; Mr Pettis, founder of MakerBot, turned it into an accessible and affordable product, in the form of a desktop 3D printer.

- **No boundaries:** **Colin Angle**, founder of iRobot, for **developing practical robots for domestic, defence, security, medical and business use**, from the floor-cleaning Roomba to the bomb-defusing PackBot.

- **Corporate use of innovation:** **Genentech**. A pioneer of the biotechnology industry, the firm has made several breakthrough innovations, including the first recombinant DNA medicine ever marketed, and therapies for cancer and age-related vision loss.

We extend our congratulations to our winners, and our thanks to the judges: Siavash Alamouti, group R&D director, Vodafone; Robin Bew, managing director, Economist Intelligence Unit; Hermes Chan, chief executive, MedMira; Jan Chipchase, executive creative director of global insights, Frog Design; Martin Cooper, chairman and chief executive, ArrayComm; George Craford, chief technology officer, Philips Lumileds; Hernando de Soto, chairman, Institute for Liberty and Democracy; Rodney Ferguson, managing director, Panorama Capital; Napoleone Ferrara, senior deputy director for basic science, University of California, San Diego; Janus Friis, co-founder, Atomico; François Grey, visiting professor of physics, Tsinghua University; Robert Guest, business editor, *The Economist*; Vic Hayes, senior research fellow, Delft University of Technology; Mo Ibrahim, founder, Mo Ibrahim Foundation; Salim Ismail, global ambassador, Singularity University; Susie Lonie, co-creator, M-PESA; Raghunath Anant Mashelkar, president, Global Research Alliance, India; Yoichiro Matsumoto, professor and dean of engineering, University of Tokyo; Oliver Morton, senior briefings editor, *The Economist*; Andrew Odlyzko, professor of mathematics, University of Minnesota; Andrea Pfeifer, chief executive, AC Immune; Lesa Roe, director, Langley Research Center, NASA; Youssef Salah, deputy head, ICT sector, Bibliotheca Alexandrina; Syl Saller, global innovation director, Diageo; Jerry Simmons, deputy director for semiconductor and optical sciences, Sandia National Laboratories; Tom Standage, digital editor, *The Economist* (chairman); Tuula Teeri, president, Aalto University; Vijay Vaitheeswaran, China business editor, *The Economist*; Jeffrey Weedman, vice-president of global business development, Procter & Gamble; Huanming Yuang, director, Beijing Genomics Institute. The judging process was run by John Eckhouse of Modern Media. ■

Thief in your pocket?



Mobile security: When it comes to mobile devices, viruses are not the problem they are made out to be—at least, not yet. Instead, the biggest risk for organisations comes from absent-minded or nefarious employees

GIVEN all the talk about mobile malware—Trojans, viruses, keyloggers, phishing expeditions and other scams infecting the phones in people's pockets—you might be forgiven for thinking cybercrooks are cleaning up at their expense. The truth is that surprisingly little malware has found its way into handsets. Smartphones have turned out to be much tougher to infect than laptops and desktop PCs. But that may change.

The makers of security software, of course, do not mind at all if mobile-phone users are led to believe their devices are vulnerable to attack. Certainly, the BYOD (bring your own device) trend that is being adopted by many companies has created headaches for network managers trying to keep up with different hardware and software. It is one thing for an individual to find a malicious app they have downloaded has racked up a large phone bill by spewing out text messages to pricey pay-to-use services, but quite another for a manager to learn that company secrets—contact lists, passwords, authentication keys, business plans and the like—have been leaking via employees' phones to competitors or criminals.

Even so, Adrian Ludwig, a senior security engineer at Google, reckons only one in 100,000 apps downloaded by Android users from all sources, legitimate or otherwise, poses any threat. Researchers at the Georgia Institute of Technology working with Damballa, a security firm based in Atlanta, agree. After surveying two networks with some 380m users between them, the researchers found evidence of malware infection on fewer than 3,500 phones—ie, one in 108,000. Given that there are around 1.5 billion smartphones and tablets in the world, that means probably fewer than 15,000 of them are harbouring mischievous software.

Why so few? Firstly, mobile-phone users are rarely "administrators" by default—unlike, say, users of Windows XP computers, where everyone has administrative privileges unless they have taken the trouble to set up individual user accounts with separate passwords. The danger, of course, is that administrators (or super-users in Linux-speak) can tinker with the settings of a device's operating system. That leaves a door ajar for hackers to sneak in, sniff around and steal secrets.

It is possible to grant administrator rights to phone users by overriding the manufacturer's security safeguards, a practice known as "jailbreaking" or "rooting" that is done to allow new functions to be added to a mobile device. Doing so, however, not only voids the maker's warranty, but can easily "brick" the device, turning it into an expensive paperweight, and also risks opening up vulnerabilities that can be exploited by malware. Fortunately, because people who jailbreak or root their phones constitute such a small minority, cyber-criminals tend not to waste too much time attacking them. Mainstream computer users still provide easier and more lucrative targets.

Another reason why mobile phones have so far remained largely free of malware is that they lead relatively sheltered lives. Most users download any apps they want (the average is around 40) from one of two official sites: Google's Play Store for Android



devices and Apple's App Store for iPhones and iPads. Both are reasonably well policed. Despite its laissez-faire reputation, Google's marketplace for apps is curated far better than most third-party sites, though not as rigorously as Apple's.

With 1m apps available for both the Android operating system and Apple's iOS, users have little reason to venture outside these walled gardens. Those who do should be aware that many third-party app stores, especially for Android devices, can be dens of iniquity, offering free downloads of pornography or pirated tunes, videos and games as honeypots for the gullible. Downloads from such sites may well have malware embedded in them.

Such tainted downloads may contain nothing more than "nuisanceware"—soft-

ware that causes adverts to pop up, unnecessary toolbars added to browsers, and home-pages diverted to inappropriate sites. Or it could be "scareware"—software that offers to scan the device for viruses and the like, and then demands payment to fix the problems it finds, which probably do not exist.

Though rare, more toxic mobile malware can collect personal data and contact lists, monitor keystrokes, track a phone's location or even take photographs or video of users and their surroundings. It can then transmit this booty back to servers run by organised crime for extortion, identity theft, scams or phishing trips. Even more worryingly, thanks to improvements in "near-field communication", phones are beginning to morph into wallets—with all the necessary links to bank accounts and credit cards—so users can make incidental payments at stations, convenience stores and elsewhere merely by waving their phone near a terminal. Cybercrooks must be rubbing their hands in glee.

The weakest link

Yet for personal phones and tablets used at work, the biggest hazard for organisations is not mobile malware, but data leakage caused by employees losing their devices, or selling sensitive corporate information collected on their mobiles. Gartner, an information-technology consultancy based in Stamford, Connecticut, advises clients not to worry too much about malware penetrating their networks through the devices employees bring to work. It is the users themselves who are the problem. How, for instance, do companies prevent employees from innocently responding to "spear-phishing attacks" in the form of individually targeted, and very official-looking, e-mail or text messages, apparently from trusted colleagues, that request sensitive information? Security measures need to focus more on educating users, says Gartner, rather than on the relatively minor problem of mobile malware.

At the very least, everyone should use an app that enables their devices to be tracked or wiped clean if lost or stolen. They can also install a mobile-security suite to block all known malicious software. That will not, of course, protect the device from unknown threats ("zero-day" attacks), but it will cut out most of the nuisance. And steer clear of third-party download sites making offers that seem too good to be true. Invariably, they are. ■



Kill switches and safety catches

Arms control: New technologies make it easier to track small arms and stop them working under certain circumstances. To what extent can they prevent the unintended or undesirable use of weapons?

TO HELP push Soviet forces out of Afghanistan in the 1980s, America's Central Intelligence Agency (CIA) gave Afghan fighters shoulder-launched Stinger anti-aircraft missiles (pictured). Accurate and easy-to-use, the Stingers caused grievous losses. But after the Soviet withdrawal in 1989, the CIA wanted to discourage the use of the leftover missiles. It got hold of some of those circulating on the black market and booby-trapped them, so that anyone who tried to fire one would have his head blown off. The aim, according to a former CIA official, was to deter both the sale and use of the remaining missiles.

Taking this sort of unconventional approach to arms control is dangerous and expensive, and can never be entirely effective. Recovering every weapon is rarely feasible. Some of the Stinger missiles from Afghanistan "percolated" to the separatist Tamil Tigers in Sri Lanka, who used them to shoot down government aircraft, says Jayantha Dhanapala, a former adviser to two Sri Lankan presidents.

Compared with fighter jets, tanks or warships, small arms and light weapons (defined as those that can be easily trans-

ported and operated by one or two people, respectively) are cheap and easy to conceal. Russia's foreign ministry estimates the black-market cost of some shoulder-launched missiles at less than \$3,000. Handguns are available in American shops for a few hundred dollars. In Africa, rocket-propelled grenades (RPGs) and other light weapons are commonly smuggled great distances in coffee sacks, notes Marco Kalbusch, head of the United Nations Office for Disarmament Affairs in Lomé, Togo. But technological tweaks may be able to help limit the spread and use of small arms, making possible weapons that stop working after a certain period of time, or can only be used by specific people or in particular places. Proponents of such technologies believe they have the potential to succeed where political and legislative attempts at arms control have failed.

Perhaps the simplest approach is the use of technological tricks that shorten weapons' lifespans. "Self-deactivating" landmines, for example, will not detonate after their battery runs down. They have been adopted by America and some of its allies, but constitute only a tiny fraction of

mines deployed around the world. In a similar vein, one proposal is that launchers for shoulder-fired missiles should only work with a uniquely configured, non-rechargeable battery manufactured in a single, tightly controlled plant. This would, in theory, limit the lifespan of the weapons for anyone without access to new batteries. But there would be workarounds. This year rebels in Syria posted video online of a portable missile-launcher rigged to an external power supply for target acquisition. It fired a missile that shot down a helicopter near the Abu ad-Duhur military airbase, south of Aleppo. Similarly rigged missiles have been fired by Hamas militants at Israeli aircraft.

Perishable weapons

Shoulder-fired missiles, RPGs, mortars, and guided anti-tank missiles could also be made to stop working after a while by engineering their chemical propellants to become inert after a predetermined period, says Patrick McCarthy, head of a UN project called the International Small Arms Control Standards. It is hardly likely that governments would buy perishable weapons of the sort for their own use, but rebel groups might accept them from a sympathetic country, at least if nothing better were on offer. This might also allay fears in the donor country that the weapons might end up in undesirable hands



► many years later.

A second approach to arms control is to track weapons electronically. Almost all illicit small arms were legally manufactured or imported and were later diverted, often with help from corrupt officials and forged documents. Discreet monitoring and tracking of shipping containers carrying weapons makes it harder to steal or reroute them. Jim Giermanski, a former US Air Force colonel, says America's Defence Department recently began shipping to Afghanistan, on commercial vessels, containers capable of reporting an opened door, vibrations from a break-in attempt and their location, derived from global positioning system (GPS) satellites. A container can, in essence, "report its own hijacking", says Dr Giermanski, now boss of Powers International, a company based in North Carolina that helps shippers adopt the tracking technology. It is just now becoming practical and inexpensive enough for wide use, he says.

In some cases it is even possible to track individual weapons by building in a transmitter that regularly signals their precise co-ordinates. This is already done for larger weapons deemed "expensive enough and consequential enough", says Lincoln Bloomfield, a former State Department official for military and political affairs who served as a special envoy under George Bush junior. Doing the same for small arms would be expensive, but the transmitter could be cleverly attached so that removing it disables the weapon.

In RPGs, a GPS transmitter could be concealed in a grip assembly, says Jean-Marc Anzian Kouadja, executive secretary of the National Commission of Small Arms and Light Weapons at Côte d'Ivoire's interior ministry. Wrench it out, he says, and you break the trigger mechanism. Governments might be willing to foot the bill to secure their stockpiles from insurgent raids or managers who might otherwise cut deals with gunrunners. But a problem, he notes, is that cyber-savvy rebels might work out how to use the technology to track government troops.

More than 80,000 people were killed in

Sri Lanka's 27-year conflict with the Tamil Tigers, according to a UN estimate. Sri Lanka's navy benefited from intelligence collected by India, an ally, to identify and intercept or destroy boats smuggling light weapons to the Tigers' bastion in the country's north-east. But more weapons would have been stopped had a satellite-tracking system been in place, says Mr Dhanapala, who also served as the Sri Lankan government's peace-process co-ordinator in 2004 and 2005. As head of disarmament affairs at the UN from 1998 to 2003, he proposed that such a system be established.

Tracking weapons can be done without satellites, however. Some armies have started using tiny radio-frequency identification (RFID) chips, like those found in contactless credit cards and public-transport tickets, which do not require batteries to operate. Instead, when they are passed close to a reader (when passing through a door, for example), the chips absorb enough radio energy to power up and transmit a short burst of identification data. Weapons passing in and out of an armoury can thus be tracked. SkyRFID, a company based in Ontario, notes that its weaponry tags are not damaged by vibration, grime or cleaning solvents. Replacing manual logging makes it harder for armoury staff to pretend munitions sold on the sly are still in stock. (A UN report on improving marking and tracing technologies is due to be published in April 2014.)

Service unavailable

Another alternative to GPS transmitters would be to track weapons by outfitting them with the inexpensive SIM cards that allow mobile-phone networks to identify subscribers. A weapon would communicate with nearby mobile-network towers to indicate its position within a rough area, says Mr Kalbusch. And a system of this sort could, in theory, form the basis of a "remote control" feature, allowing weapons to be disabled from a distance.

"Kill switches" or "backdoors", as these features are sometimes known, have so far been associated with expensive weapon systems that must send and receive data to operate. David Kay, America's most senior arms inspector in post-Saddam Iraq, has noted that one of the reasons why Russia's best air-defence systems have not been installed in Iran is probably because the Iranians fear that Russia might be capable of

countermanding missile launches against certain countries' aircraft. Now similar "override" systems are being applied to small arms, too.

TriggerSmart, a company based in Limerick, Ireland, has developed a motorised mechanism that can block or unblock the trigger of an assault rifle. It is controlled not by a switch on the weapon itself, but rather by a command sent from an aircraft, satellite, mobile-network tower or radio station. Weighing less than 30 grams (including a standard AAA battery), the mechanism allows an "offending weapon" to be remotely disabled, says Patrick O'Shaughnessy, TriggerSmart's head of research and development. It costs about \$150 to retrofit an existing rifle or build the technology into a new one.

The biggest buyers, Mr O'Shaughnessy reckons, will be armies that work with foreign security forces. American officials have expressed interest. One in six of the Western troops killed last year in Afghanistan was slain in an "insider attack" by a partner in the country's security forces. TriggerSmart's technology could allow any member of a unit to block the use of firearms by partner forces. But being expected to use weapons that can be remotely disabled hardly seems likely to engender trust. And it would be impractical to introduce light-weaponry override systems in their current form for large numbers of soldiers or police, says Richard Rowe, a retired US Army major-general who oversaw the instruction and equipping of 550,000 Iraqi security recruits.

Even with further technological advances, few armies will be eager to adopt such kit, Mr Kalbusch says. Governments would worry that their arsenals could be neutered by an adversary, or, more straightforwardly, by the country that supplied the arms. Attempts to mandate use of the technology seem unlikely to succeed, because small arms are made in many countries. And sometimes foreign powers want rebels to steal a government's weapons and use them against it, as Western-supported opponents of Libya's Qaddafi regime did in 2011.

Away from the battlefield, other arms-control technologies are being developed to prevent the unintended or unauthorised use of weapons belonging to civilians or police officers. In the decade to 2010, 1,217 American minors were killed in accidental shootings, according to the most recent data from the Centres for Disease Control. And it is not uncommon for a police officer to be shot with a service ►►

"Personalised firearms will fire only when held by the owner or another authorised person."

▶ weapon that has been wrested away.

Accordingly, new "personalised" firearms are being developed which fire only when held by the owner or another authorised person, with the specific aim of preventing a gun owner (and his family or co-workers) from being killed with his own weapon. Because the verification takes place within the weapon itself, its backers note, the technology is more likely to be accepted than remote-override features on military weapons.

Such "smart guns" were discussed by diplomats, gunmakers and other experts at SmartCon, an arms-control conference held in Berlin in June, organised by the German foreign office and the Bonn International Centre for Conversion, a non-profit group that promotes demilitarisation and development. One example is a .22-calibre pistol called IP1 (pictured on previous page), made by Armatix, a German firm. It only fires if the shooter is wearing a special wristwatch containing an RFID chip, which is detected by the gun. If the gun is more than 40 centimetres from the RFID chip, its trigger locks. Attempting to disable the trigger lock destroys the IP1 "irrevocably", according to Maximilian Hefner, the firm's boss. The list price is \$1,699.

A similar system for shotguns, called M-2000, has been developed by iGun Technology Corporation, based in Florida. When an RFID chip embedded in a ring is brought near the shotgun, a solenoid switch instantly unlocks the trigger. (Alternatively, the chip could be surgically implanted in the owner's hand.) The system is seamless, according to Jonathan Mossberg, the firm's founder. "You pick up the gun, pull the trigger, it goes boom—no thought involved," he says. The battery inside the gun that powers the RFID reader lasts for more than eight years, and it sounds a warning alarm after six years. It costs about \$200 to add to a firearm.

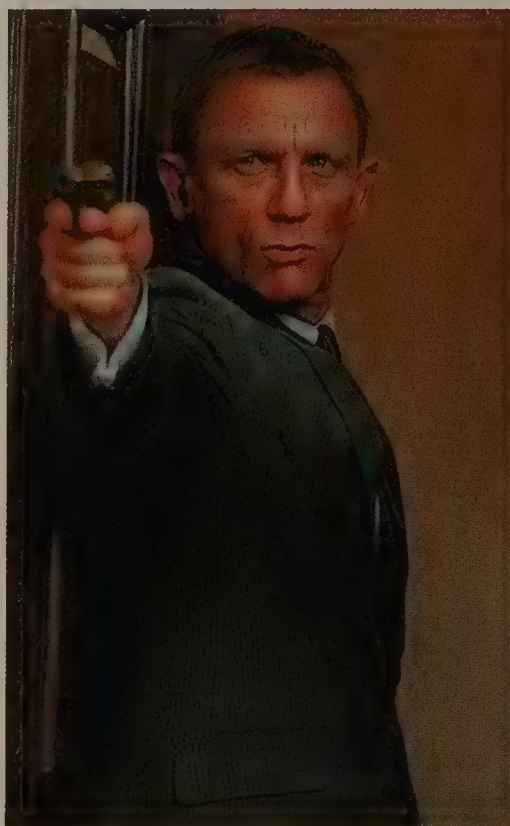
A wristwatch or a ring could be stolen, however, so other smart guns rely instead on biometric characteristics of their owner's body, such as a fingerprint. The New Jersey Institute of Technology has devised a personalised Beretta pistol. When its magnetic trigger is pulled past a sensor in the trigger guard, a chip is switched on to crunch data from pressure-sensing piezoelectric sensors in the handgrip. Only if they match the owner's bone geometry and "grip dynamics" does the trigger unlock. All this happens within the tenth of a second it takes to pull the trigger all the way back. The system is not foolproof: on average, around 1% of people with the

same hand size will be able to fire a gun personalised for a particular user. But a gun set up for an adult cannot be fired by a child. The US Army is testing the system at an armaments laboratory in Picatinny, New Jersey.

Firearms that are unlocked with a fingerprint reader have been developed by Kodiak Industries, based in Utah, and Safe Gun Technology, based in Georgia. Biometric Systems, a firm based in Los Angeles, California and Ferlach, Austria, is designing a biometric kit to retrofit pistols. Barack Obama has encouraged the development of such technologies and has directed America's attorney general to review them. Smart-gun technology also received a boost last year when it won the fictional endorsement of James Bond in "Skyfall". Issued a gun coded to his palmprint that only he can fire, Bond is told that it is "less of a random killing machine, more of a personal statement".

Technology for tyrants?

And yet demand looks weak, especially in America, by far the biggest market for civilian firearms: the iGun M-2000 failed to sell at all. Maxim Popenker, an author of firearm reference books based in St Petersburg, Russia, observes that sooner or later a bad guy will shoot a good guy because the latter's personalised gun refuses to fire due to "gloves, dirt, sweat, blood or stress".



007 makes a personal statement

Gun enthusiasts have raised similar objections: personalised smart guns are simply less effective for self-defence, they argue, because of the risk that the safety technology will fail to work properly. Triggers could be unlocked by voice, but this risks betraying the position of someone hiding.

Echoing an attitude shared by many gun enthusiasts, David Codrea, an editor at *Guns* magazine, cautions that "stupid electronic doodads" could render a firearm useless, would be ignored by criminals and would raise the price of firearms for everyone else. Lawrence Keane of the National Shooting Sports Foundation in Connecticut notes that owners of "authorised-user-only" firearms might be lulled into letting others handle them carelessly. He rejects the term "smart guns" because "it's people who are dumb or smart". Some gun owners are also predictably suspicious of technologies like TriggerSmart's "wide-area control" system that could use an encrypted wireless signal to disable smart guns in schools, airports and other areas. An editorial on BearingArms.com, a pro-gun website, in August called smart guns "a dumb idea" and said the ability to disable them was a "technology for tyrants" that would give governments a monopoly on the use of force.

Such concerns present a big obstacle to the adoption of smart firearms. Indeed, "immense pressure" and boycotts from pro-gun groups persuaded many firms to abandon development of smart weapons, says Wolfgang Bindseil, an arms-control official at the German foreign office. Gunmakers that gave up include Metal Storm in Australia, FN Herstal in Belgium, and Colt, Smith & Wesson and Taurus International Manufacturing in America.

Mr Mossberg of iGun wonders whether attitudes will change as fingerprint readers in smartphones (including the latest iPhone) and wireless key fobs for cars become more widespread and are shown to be reliable. Whether that is just wishful thinking may soon become apparent. Despite protests from gun-rights groups, New Jersey passed a law in 2002 that requires all non-antique guns sold in the state to be smart, starting about three years after the attorney-general determines that the technology is up to snuff and for sale. That countdown could begin soon: smart pistols made by Armatix arrived in American gun shops in November 2013. Arms-control technologies face formidable opposition to adoption on the battlefield, but will now have a chance to prove themselves in the marketplace. ■



Bacchus to the future

High-tech winemaking: Technology has already made poor plonk a thing of the past. What can it do to improve the world's finest wines?

IT IS five o'clock in the morning at the height of California's harvest season, and the full moon hanging low over the Carneros hills bathes the chardonnay vineyards in cheese-yellow light. A crew of 30 Mexican grape-pickers, wearing headlamps and orange safety vests, races down the rows in silence, deftly severing the bunches with crescent-shaped knives and dropping them into plastic bins. They have to work fast in the cool night air, taking a few seconds to strip each plant, because within an hour it will be too warm to harvest the fragile grapes. "They are skilled, more than they're given credit for," says Towle Merritt, a general manager at Walsh Vineyards Management, the viticulture firm that employs them.

Harvest night has also arrived at a cabernet sauvignon vineyard 36km (23 miles) to the north, in the heart of the Napa valley. But here there are no artificial lights, portable toilets or on-site sorting teams. Instead, a single driver pilots a 3.65-metre (12 feet) high arch-shaped tractor towards the end of a row. The earth below is highly uneven, but the vehicle's massive wheels, each with its own gyroscope and hydraulic controls, extend, twist and tilt to keep the

cab perfectly level as they line up on either side of the vines. The driver launches the tractor straight along the top of the row. The engine whirrs, branches crackle and leaves fly into the air as he zips along.

Underneath, ten pairs of flexible fibre-glass rods are swinging back and forth, their amplitude, frequency and spacing specified by the driver. The vibration separates the grapes from the plant, and a conveyor belt brings them to the top of the vehicle. There, they pass over a series of rollers whose spacing lets the berries through while trapping stray stems and leaves. The vines look undisturbed save for their lack of fruit, their naked stems eerily exposed. The machine, made by Pellenc, a French firm, will harvest 20 tonnes of grapes tonight: enough to make 18,000 bottles of wine, and a harvest that would otherwise require 40 workers.

Mechanical harvesting is not new: makers of bulk wine dispensed with hand-picking in the 1970s. But using machines was long associated with low-end wineries that could not afford traditional artisanal methods. "Technology has vastly improved the low end," says Tim Keller, a former winemaker at Steltzner Vineyards

in Napa. "There's no longer an excuse for making a defective wine."

Now, however, the stigma of automation is declining, and more prestigious producers have become open to the use of technology in winemaking. That has prompted inventors to devise new machines to meet their exacting needs. Because consumers remain seduced by the notion that wine should be made by humble farmers with as little intervention as possible, fine-wine labels still try to keep their experiments under wraps. But they are quietly deploying technology in a new way: not just to make bad wine decent, or to make good wine more cheaply, but to make already-great wines greater still.

A picky bunch

Few industries are more suspicious of change than winemaking. Archaeological evidence suggests that humans have been drinking fermented grape juice since at least 7000BC. Presses and fermentation vats were in use by 4000BC. Even the sites of the best vineyards have been known for centuries: in 1663 the English diarist Samuel Pepys wrote of "a sort of French wine, called Ho Bryan, that hath a good and most particular taste." The 2010 vintage of Haut Brion starts at \$800 a bottle.

Most of this accumulated know-how involves creating the best conditions for winemaking to take its natural course. The beverage occurs in the wild: if grapes are left to rot, their juice can ferment using native yeast. But there are an infinite number of pitfalls along the path from vine to wine: weather, pests, problems with fermentation, oxidation and so on. Through ►►

"Some winemakers try the same wine at a host of different alcohol levels to see which tastes best."

centuries of trial and error, vintners have discovered techniques to minimise these risks. Of recent advances in this field, the most technically impressive is probably optical sorting. Food companies have long used cameras and image-processing software to separate and discard low-quality products. But the first sorter designed especially for wine was not released until 2007.

Made by Pellenc, it looks like an over-size pinball machine. After destemming, the grapes fall onto a vibrating metal plate that separates them, and proceed to a conveyor belt made of 99 thin rubber cords moving at 22kph (14mph). They then pass under a brilliant halogen light, where a digital camera takes a snapshot. In 30 milliseconds, the device compares each berry's shape, size, and colour with the winemaker's guidelines, and "shoots down" the rejects with a quick puff of air, making a sound like a typewriter. "It looks like a blueberry tart," says Bruno-Eugene Borie, the owner of the Ducru-Beaucaillou winery in Bordeaux, while admiring his machine's output. "All the berries are perfect."

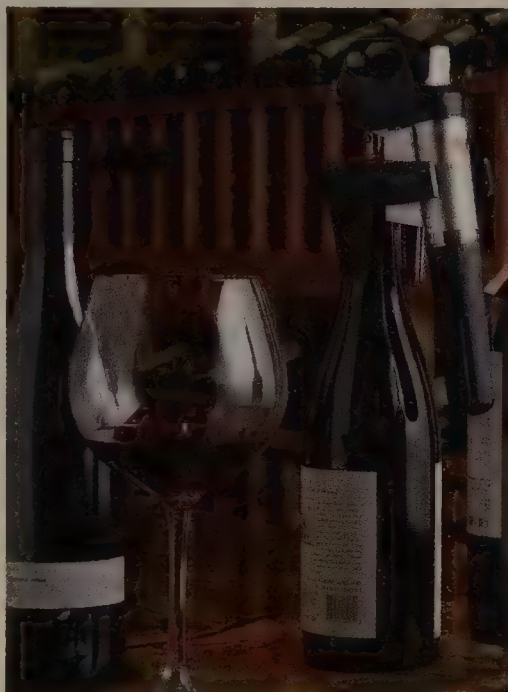
Pellenc has already sold more than 1,000 of the units, which can cost up to \$250,000. Its success has attracted competitors, such as Bucher Vaslin, another French firm. France is the undisputed global leader in wine technology. As Mr Merritt notes, the country has a greater demand for mechanisation than America because its agricultural wages are higher. And France's reputation means that its elite winemakers, unlike those in other countries, do not have to worry about criticism from elite French winemakers.

Seeking closure

One of the few areas where a non-French company has taken the lead is in closures—a logical consequence of the requirement under French law that wine must be bottled using natural cork. The traditional seal has long frustrated producers with the inconsistent amount of air it lets through and its tendency to become tainted with TCA, a compound that makes wine smell like wet cardboard. However, the primary alternative—a fully airtight screw cap—is shunned by oenologists who believe that ageworthy wines require a bit of oxygen to mature. After leaving Steltzner, Mr Keller co-founded a startup, VinPerfect, that he says should end the "closure wars" once and for all. It makes a screw cap containing an aluminium-coated plastic liner, similar to the finishes on mirrored sunglasses. This allows the winemaker to choose precisely how much oxy-

gen should enter the bottle over time, while eliminating the risk of TCA.

Another longtime headache for vintners is premature oxidation ("premo"), a condition that makes white wines taste like a browned apple or toasted bread. Vivelys, a French firm, has found that adding controlled amounts of oxygen before fermentation makes wine more resistant to premo later on, as well as giving it a creamier mouthfeel. Its new Cilyo machine injects small quantities of the gas into a sample, determines how fast the "must" consumes it and calculates the optimal amount. At Domaine Chandon in Napa, owned by the French luxury conglomerate LVMH, the device is used to determine a separate dosage for each tank.



The Coravin lets you finish it next week

A more controversial wine-adjusting technology is reverse osmosis (RO). In the 1990s, partly driven by the preferences of Robert Parker, an influential American critic, many producers began delaying their harvests in order to make fuller, fruitier reds that could be drunk without lengthy cellaring. More ripening time meant more sugar, which fermentation turned into alcohol. Wines that once carried 12-13% alcohol began reaching 15-16% or more.

To avoid this side-effect, producers turned to RO, a technique that is also used to desalinate water. The smallest molecules in wine are water and alcohol. By passing wine at high pressure over a membrane with tiny pores, those compounds can be separated from the rest of the liquid. Only the water is added back in, reducing

the wine's alcohol level. Slightly more porous membranes can also be used to remove other unpleasant chemicals like acetic acid (vinegar) and ethyl acetate (a chemical used as nail-polish remover).

RO has its share of critics. Purists contend that it is "cheating" and takes wine too far away from its natural roots; sceptics argue that the process strips crucial aromas as well as alcohol. But demand for the practice far exceeds the number of producers that will admit to it. WineSecrets, a firm in California, even lets clients try the same wine at a host of different alcohol levels to see which one tastes best. "Winemakers can't be honest about what they do, because they'll be accused of manipulation," says Clark Smith, an American consultant credited with popularising RO. "When winemakers hear 'manipulation', they think, 'What, you don't want me to pick the fruit or crush the grapes?' They're forced to dissemble or they get demonised."

The need for technology does not end once the bottles leave the winery. The biggest problem is probably forgery. In 2008 Laurent Ponsot, the head of Domaine Ponsot in Burgundy, flew to New York to interrupt an auction in which a series of wines with his labels were on sale—in vintages when they were never produced. Their consignor has been arrested for fraud, but Mr Ponsot is now set on ensuring that consumers get what they pay for. To combat fakes, he applies a "bubble seal" to every bottle. Made by Prooftag, another French firm, it contains both a serial number and a unique pattern of bubbles embedded in plastic, and is destroyed when the wine is opened. Anyone can check the pattern for each bottle number on Prooftag's website.

Another grave risk is poor storage. Excessive heat and inappropriate humidity can ruin a wine without leaving a trace on the bottle. Ponsot has affixed a thermal dot to his label that changes colour irreversibly when exposed to dangerous temperatures. He also asked eProvenance, a firm based in Boston, to install sensors that track the temperature and humidity inside every case—all the way from the winery to the retailer's shelf. The company says that 16% of the cases it has tracked so far surpass the danger threshold of 28°C, and hopes to create a new market for "aroma insurance" on heat-damaged shipments.

Technology can even help after a bottle has been opened, by preserving the wine if it is not all going to be consumed immediately. Greg Lambrecht, an American with a background in medical devices, believes he has solved this conundrum with a price-
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► ey contraption called the Coravin. It looks like a small bicycle pump, and attaches to the neck of a bottle. At its heart is a steel needle with holes on the sides, originally devised for medical use, to access a vascular port implanted under a patient's skin. The Coravin's low-friction, Teflon-coated version of this needle glides through a cork effortlessly, allowing the user to pour out a stream of wine. A lever on the top opens a valve that shoots inert argon gas into the bottle at high pressure, filling the space vacated by the liquid. Once the user has served a glass and removed the Coravin, the cork automatically reseals. "Cork was the key invention," says Mr Lambrecht. "It's so elastic, you can compress it to 10% of its size, and it will pop back to 98%. I've never found anything like it."

The jury is still out as to the longevity of the wine remaining in the bottle after it has first been "accessed", in Mr Lambrecht's terminology. But he says he has conducted a series of blind tests with expert tasters, who cannot tell an untouched bottle from one that was half-drunk through a Coravin months before. "Now I have zero hesitation between me and a great glass," he says. "I have a magnum of 1988 Bordeaux I've been drinking for ten years." Since its debut in July 2013, nearly 10,000 of the devices have been sold, at a price of \$270.

Technology is already transforming winemaking, from harvest to consumption. But there is plenty of scope for further innovation. The next frontier is greater use of technology in the vineyard itself. What are the elements of great *terroir*, as the French call the intersection of soil and climate in a given plot? And how can producers get the best out of their land? In the past vintners

relied on rules of thumb to decide where to plant, looking for clay and limestone soils with good drainage and not too much wind. They can now be far more precise.

Lynch Bages, an august Bordeaux producer, trained a satellite on its vineyards and assessed how each subplot reflected visible, infra-red and ultraviolet light, a measure of the intensity of vegetation. (Counterintuitively, deep-green areas yield poor wine: since they are so fertile, the vine produces weak grapes in high volumes rather than smaller quantities of concentrated fruit.) Then it measured the soil's electrical conductivity, which corresponds to its ability to transmit nutrients to roots. In a third study, the estate dug 200 holes to determine mineral concentrations and soil acidity. After combining the results, Lynch Bages carved 50 new plots out of larger, heterogeneous parcels, and is replanting many of them with grape varieties that are better matched to the soil.

Bearing fruit

A vine's water-use can be measured just as accurately. Fruition Sciences, a company founded by two French graduate students, applies heat sensors to vine branches to measure how fast sap flows through them, and thus how much water is transpiring through the plant. The sensors wirelessly transmit the data every 15 minutes, and send an alert if irrigation is needed.

Catena Zapata, an Argentine winery, is putting thermometers on roots to study the effect of their temperature on grape development. At Ducru-Beaucaillou in Bordeaux, the winemaker sends tractors armed with cameras and GPS locators to every plot ten days before the planned har-

vest. They record grape colours and calculate the concentration of anthocyanins, a valuable antioxidant. This determines which parcels are picked first. "Within five to ten years, we'll be able to do a full analysis of each berry's ripeness and skin thickness," says Mr Borie, the estate's owner. "We want the purest Ducru possible, and you can only do that with technology."

Another avenue of research involves analysing the thousands of different chemical compounds found in red wine, to determine how its composition affects the way humans perceive it. These compounds can be separated and analysed using a technique called gas chromatography-mass spectrometry. Many of the compounds in wine have never been catalogued, and even among those that have, subtle differences in structure can lead to big differences in humans' sensory reactions. Characterising them fully requires nuclear-magnetic resonance spectroscopy, a technique in which the isolated substances are placed in a magnetic field, and their absorption of radiation is measured at different points. "It's like a puzzle," says Axel Marchal of the Institute of Vine and Wine Sciences (ISVV) in Bordeaux.

The ISVV's spectrometers are custom-built, with slots carved out for researchers' noses so they can smell each compound separately. This technique has led to successes in the past: it was used to identify thiols as the source of the signature passion fruit aroma in sauvignon blanc, and methoxypyrazines as the cause of bell-pepper smells in cabernet sauvignon. Further research showed that pruning leaves at the bottom of the vine sharply reduces methoxypyrazine concentration, one reason why Bordeaux reds taste far less "green" than they once did. Unfortunately, most aromas are not that simple. They are often produced not by individual compounds but by combinations of chemicals, including some that are odourless but modify the effect of others on nerve receptors. "The human nose is a very powerful detector," says Mr Marchal. "It's much more powerful than mass spectrometry."

The grape genome was sequenced in 2007, and scientists are optimistic that they will begin to unmask the relationships between *terroir*, vine, wine and perception in the coming years. But for now, the fluid remains as magical and befuddling as ever. "The more we know, the less we know," says David Stevens, an American wine consultant. Even after 9,000 years, there is still plenty of scope for technological innovation in winemaking. ■



Fruition Sciences' sensors let thirsty vines call for water



Bitcoin under pressure

Virtual currency: It is mathematically elegant, increasingly popular and highly controversial. Bitcoin's success is putting it under growing strain

ALL currencies involve some measure of consensual hallucination, but Bitcoin, a virtual monetary system, involves more than most. It is a peer-to-peer currency with no central bank, based on digital tokens with no intrinsic value. Rather than relying on confidence in a central authority, it depends instead on a distributed system of trust, based on a transaction ledger which is cryptographically verified and jointly maintained by the currency's users.

Transactions can occur directly between the system's participants at almost zero cost, without the need for a trusted third party or any other intermediary, and are irreversible once committed to a permanent and fully public record. Bitcoin's mathematically elegant design ensures that the money supply can increase only at a fixed rate that slows over time and then stops altogether. Anonymity, while not assured, is possible with the right precautions and tools. No wonder Bitcoin is so appealing to geeks, libertarians, drug dealers, speculators and gold bugs.

Bitcoin began in 2008, at the height of the financial crisis, with a paper published under the pseudonym Satoshi Nakamoto.

The technical design outlined in the paper was implemented in open-source software the following year. It came to widespread prominence in 2012 and has been in the headlines ever since.

Investors are backing Bitcoin-related startups, the German finance ministry has recognised it as a "unit of account" and senior officials told an American Senate committee on November 18th that virtual currencies had legitimate uses. But there have also been many cases of Bitcoin theft. Exchanges that convert Bitcoin to other currencies have collapsed or closed. Silk Road, an online forum where illicit goods and services are traded for Bitcoin, was shut down by America's Federal Bureau of Investigation in October but has since reopened. The Bitcoin price has fluctuated wildly, hitting \$230 in April 2013, falling below \$70 in July, and then exceeding \$600 in November, prompting talk of a bubble.

The system is now straining at the seams. Its computational underpinnings have collectively reached 100 times the performance of the world's top 500 supercomputers combined: more than 50,000 petaflops. Bitcoin's success has revealed

three weaknesses in particular. It is not as secure and anonymous as it seems; the "mining" system that both increases the Bitcoin supply and ensures the integrity of the currency has led to an unsustainable computational arms-race; and the distributed-ledger system is becoming unwieldy. Will Bitcoin's self-correcting mechanisms, and the enlightened self-interest of its users, be able to address these weaknesses and keep Bitcoin on the rails?

Bitcoin uses a technique called public-key cryptography, which relies on creating an interlocking pair of encryption keys: a public key that can be freely distributed, and a private one that must be kept secret at all costs. The public key is treated as an address to which value may be sent, akin to an account number. Each transaction involves the paying party signing over a portion or all of the value in one of these addresses by using his private key to perform an operation, called "signing", on the contents of the transfer, which includes the recipient's address. Anyone can use the sender's public key to verify that the sender's private key signed the transaction. All transactions are appended to a public ledger, called the block chain.

Public keys are ostensibly anonymous, because they are created randomly by software under the control of each user, without central co-ordination. But it turns out that the flow of money from specific addresses can be tracked quite easily. In a paper presented in October, academics from the University of California, San Diego, and George Mason University engaged in a series of ordinary transactions to collect commonly used addresses for Bitcoin wallet services, gambling sites, currency exchanges and other parties.

Follow the money

The researchers exploited a current weakness in most Bitcoin personal and server software, which generates single-use addresses to store change from transactions. This allowed them to follow the movement of Bitcoins across hundreds of transactions from large sums accumulated at single addresses, including ones suspected of being controlled by Silk Road and stolen funds from exchanges. One of the authors, Sarah Meiklejohn, says that the same technique could easily be used to provide the basis of warrants to serve against exchanges or other parties. Law-enforcement agencies would regard this as a good thing, but to advocates of a completely secure and anonymous online currency, it represents a worrying flaw. Ms Meiklejohn

"The volunteer programmers who work on Bitcoin's software have no special authority in the system."

► says most current implementations of the Bitcoin protocol fall short of the level of anonymity that is theoretically possible, and that her group's efforts represent just the tip of the iceberg of what could be deduced from analysis of the public block chain.

The Bitcoin system offers a reward to volunteer users, known as "miners", who bundle up new transactions into blocks and add them on to the end of the chain. The reward is currently 25 Bitcoins (about \$15,000 at this writing). Miners pull active transactions waiting to be recorded from the peer-to-peer network and perform the complex calculations to create the new block, building on the cryptographic foundation of the previous block. Comparison of the results produced by different miners provides independent verification. About every 10 minutes, one lucky miner who has generated the next block is granted the 25-Bitcoin reward, and the new block is appended to the chain. The process then starts again.

Mine craft

The Bitcoin system is designed to cope with the fact that improvements in computer hardware make it cheaper and faster to perform the mathematical operations, known as hashes, involved in mining. Every 2,016 blocks, or roughly every two weeks, the system calculates how long it would take for blocks to be created at precisely 10-minute intervals, and resets a difficulty factor in the calculation accordingly. As equipment gets faster, in short, mining gets harder. But faster equipment is constantly coming online, reducing the potential rewards for other miners unless they, too, buy more kit. Miners have formed groups that pool processing power and parcel out the ensuing rewards. Once done with ordinary computers, mining shifted to graphics-processing units, which can perform some calculations more efficiently. Miners then moved on to flexible chips that can be configured for particular tasks, called field-programmable gate arrays. In the past year, bespoke chips called ASICs (application-specific integrated circuits) have appeared on the scene.

Your correspondent visited a miner who operates a rack of mining hardware in his modest apartment. He had purchased his ASIC-based hardware a few months earlier, and it had arrived weeks late, causing him to miss out on a bonanza, because after arrival, the kit generated Bitcoins so quickly that it paid for itself within three days. But the edge that ASICs provide is quickly eroding. Between July, when the

gear arrived, and mid-November, the computational capacity of the Bitcoin network increased 25-fold, from 200 trillion to 5 quadrillion hashes per second. This was due in part to the arrival in September of a newer generation of more efficient ASICs. Hashing capacity has increased so rapidly in 2013 that the practice of hijacking thousands of PCs and using them for mining is no longer worth the effort. The average time between blocks has fallen to between five and eight minutes.

The general consensus, says Mike Hearn, one of the volunteers who maintain the Bitcoin software, is that with this new generation of ASICs, mining will have approached a point where only those



with access to free or cheap electricity will continue operations, and even they will produce a relatively marginal return on investment, rather than the huge multiples (when exchanged into traditional currency) possible even earlier this year. Mining has become increasingly commercial and professional, he says. Server farms with endless racks of ASIC cards have already sprung up. But as part of Bitcoin's design, the reward for mining a block halves every 210,000 blocks, or roughly every four years. Sometime in 2017, at the current rate, it will drop to 12.5 Bitcoins. If the returns from mining decline, who will verify the integrity of the block chain?

To head off this problem, a market-based mechanism is in the works which will raise the current voluntary fees paid by users (around five cents per transaction)

in return for verification. "Nodes in the peer-to-peer network will try to estimate the minimum fee needed to get the transaction confirmed," says Mr Hearn.

Bitcoin's growing popularity is having other ripple effects. Every participant in the system must keep a copy of the block chain, which now exceeds 11 gigabytes in size and continues to grow steadily. This alone deters casual use. Bitcoin's designer proposed a method of pruning the chain to include only unspent amounts, but it has not been implemented.

As the rate of transactions increases, squeezing all financial activity into the preset size limit for each block has started to become problematic. The protocol may need to be tweaked to allow more transactions per block, among other changes. A further problem relates to the volunteer machines, or nodes, that allow Bitcoin to function. These nodes relay transactions and transmit updates to the block chain. But, says Matthew Green, a security researcher at Johns Hopkins University, the ecosystem provides no compensation for maintaining these nodes—only for mining. The rising cost of operating nodes could jeopardise Bitcoin's ability to scale.

The original paper that sparked the creation of Bitcoin has since been supplemented by layers of agreed-upon protocol, updated regularly by the system's participants. The protocol, like the currency, is a fiction they accept as real, because rejection by a large proportion of users—be they banks, exchanges, speculators or miners—could cause the whole system to collapse. Mr Hearn notes that he and other programmers who work on Bitcoin's software have no special authority in the system. Instead, proposals are floated, implemented in software, and must then be taken up by 80% of nodes before becoming permanent—at which point blocks from other nodes are rejected. "The rules of the system are not set in stone," he says. The adoption of improvements is up to the community. Bitcoin is thus both flexible and fragile.

So far, it has kept going. But can it withstand the pressure as it becomes more popular? "It's got this kind of watch-like feel to it," says Mr Hearn. It keeps on ticking, but "a mechanical watch is fragile and can be smashed." Perhaps Bitcoin, like the internet, will smoothly evolve from a quirky experiment to a trusted utility. But it could also go the way of Napster, the trailblazing music-sharing system that pioneered a new category, but was superseded by superior implementations that overcame its technical and commercial flaws. ■

The internet's fifth man

Louis Pouzin helped create the internet. Now he is campaigning to ensure that its design continues to evolve and improve in future

AT A glitzy ceremony at Buckingham Palace this summer, Queen Elizabeth II honoured five pioneers of computer networking. Four of the men who shared the new £1m (\$1.6m) Queen Elizabeth Prize for Engineering are famous: Vint Cerf and Bob Kahn, authors of the protocols that underpin the internet; Tim Berners-Lee, inventor of the world wide web; and Marc Andreessen, creator of the first successful web browser. But the fifth man is less well known. He is Louis Pouzin, a garrulous Frenchman whose contribution to the field is every bit as seminal.

In the early 1970s Mr Pouzin created an innovative data network that linked locations in France, Italy and Britain. Its simplicity and efficiency pointed the way to a network that could connect not just dozens of machines, but millions of them. It captured the imagination of Dr Cerf and Dr Kahn, who included aspects of its design in the protocols that now power the internet. Yet in the late 1970s France's government withdrew its funding for Mr Pouzin's project. He watched as the internet swept across the world, ultimately vindicating him and his work. "Recognition has come very, very late for Louis," says Dr Cerf. "Unfairly so."

Born in 1931, Mr Pouzin grew up in his father's sawmill in a village in central France. Drawn to the dangerous machines he was barred from touching—not just the saws, but the steam engine that powered them—he tinkered instead with a Meccano construction kit. His parents encouraged him to apply to the École Polytechnique, France's most prestigious technical university. After graduating, Mr Pouzin designed machine tools for the state-run post, telegraph and telecoms provider (PTT).

But then, in the 1950s, he read an article in *Le Monde*, reporting from an annual exhibition of office suppliers at which IBM, an American technology firm, promised that its computers would soon handle all sorts of bureaucratic drudgery. Enchanted by the potential of computerisation, Mr Pouzin moved to Bull, IBM's French competitor. There he managed a dozen engineers crafting applications for the Gamma 60, a temperamental machine "which filled two large rooms across two different floors". But the rigours of the

job—and Bull's partnership with RCA, an American company—exposed the limits of his skills. "I realised if I didn't learn to program or speak English I couldn't have a career in computing," he recalls.

A two-year sabbatical at the Massachusetts Institute of Technology gave him the chance to do both. In the early 1960s Mr Pouzin moved his young family to America, where he joined a pioneering team working on time-sharing systems, which aimed to make better use of expensive mainframe computers by enabling several users to run programs on them at once. Mr Pouzin created a program called RUNCOM that helped users automate tedious and repetitive commands. That program, which he described as a "shell" around the computer's whirring innards, gave inspiration—and a name—to an entire class of software tools, called command-line shells, that still lurk below the surface of modern operating systems.

The French exception

In the late 1960s France's politicians launched an ambitious plan to bolster the country's computing industry. In 1971 they challenged IRIA, a state-funded computer-science institute, to begin research into a national computer network. Mr Pouzin was asked to lead the project, which became known as CYCLADES.

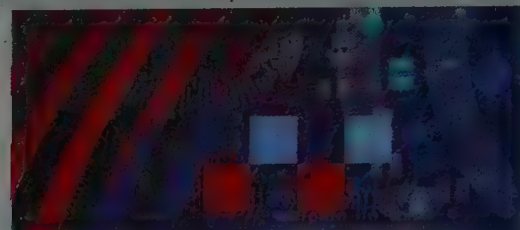
Mr Pouzin visited American universities to learn more about ARPANET, a network funded by the military that had been switched on two years before, and which relied on a promising new technique called "packet switching" to deliver data from one machine to another. Chopping up all communications into data packets of fixed size, and allowing machines to relay packets to each other, meant that there was no need for a direct link between every pair of machines on the network. Instead, they could be wired together with relatively few connections, reducing the cost and increasing the resilience of the network. If a network link failed, packets could take a different path.

But to Mr Pouzin, ARPANET seemed over-designed and inefficient. Every computer required a complex piece of hardware to link it to the network, because ARPANET's design included a connection set-up phase, in which a path across the network was established for communication between two machines. Packets were then delivered in order along this path.

Mr Pouzin's team came up with a leaner, more efficient way to do things. Instead of deciding in advance which path ►►



"The internet itself has not changed in 30 years. A century from now it must not be the same."



▶ a series of packets should travel along, they proposed that each packet should be labelled and delivered as an individual message, called a datagram. On ARPANET, strings of packets travelled like carriages of a train, travelling in strict order from one station to another. On CYCLADES, packets were individual cars, each of which could travel independently to its destination. The receiving computer, not the network, would then juggle the packets back into order, and request retransmission of any packets lost in transit.

Such "connectionless" packet-switching reduced the need for sophisticated and costly equipment within the network to establish predetermined routes for packets. The system's simplicity also made it easier to link up different networks. The first CYCLADES connection, between Paris and Grenoble, debuted in 1973—closely watched by Dr Cerf and Dr Kahn, two American scientists who were by this time mulling how best to overhaul ARPANET. They built on Mr Pouzin's connectionless, datagram-based approach, so that concepts from CYCLADES found their way into the TCP/IP suite of protocols on which the modern internet now runs.

Connection lost

Yet the innovations that made CYCLADES so compelling to Dr Cerf and Dr Kahn stirred hostility within France's PTT and other state-run telecoms providers across Europe. Their engineers considered the design untrustworthy and disliked the way CYCLADES removed intelligence from the network. Mr Pouzin did little to calm fears that his network threatened the PTTs' traditional way of doing things. John Day, an American computer scientist, recalls one particularly fiery presentation in 1976. "Louis showed a picture of a castle, marked 'PTT'," he says. "A user hung by a noose from its rampart; others were storming the walls."

During the 1970s Europe's state-run telecoms operators were building their own data networks, based on the circuit-switching technology used to carry phone calls. "It was complicated and expensive," says Mr Pouzin, "and that's why they liked it." Georges Pompidou, France's president, had supported IRIA, but after his death in 1974 the government turned against it. In 1978 the budget for CYCLADES was slashed. "They said, 'You've done a good job. Now go fly a kite'," says Mr Pouzin.

That same year the PTT switched on TRANSPAC, a connection-oriented data network of its own design. "It was a blun-

der," says Mr Pouzin, "a dead end". It did not seem so at first—TRANSPAC underpinned Minitel, a wildly successful consumer-information service which France's phone company launched in 1982. Minitel offered French citizens online banking, travel reservations and pornographic chat rooms a decade before the world wide web. By the late 1990s it had 25m users. But it proved unable to compete with the internet and was eventually shut down.

Twenty years after the government junked CYCLADES, Maurice Allègre, Mr Pouzin's former boss and ally, was still mourning the decision. "We could have been pioneers of the internet," he wrote in 1999. "Now we are only its users, far from those who decide its future." Mr Pouzin moved on to other projects and eventually went into academia. "We wasted a lot of a great man," argues Mr Day. "The French were slow to take to the internet, partly because of this history. But now that the network is a *fait accompli*, Louis has become their hero."

In 2003 the government named Mr Pouzin Chevalier de la Légion d'Honneur, one of France's highest awards. Mr Pouzin is now 82, and nominally retired. But like many other networking pioneers he is using his fame to campaign for greater openness and transparency on the internet, as its elegant design comes under growing commercial and political pressure. He is a vocal critic of its haphazard governance, in which key decisions are made by a hotchpotch of companies, charities and well-connected geeks, many of them based in America and largely unaccountable to users elsewhere in the world. He worries in particular about the growing clout of the five or six biggest web firms, which encourage users to stay within "walled gardens" of related sites and apps. To Mr Pouzin, this violates the internet's tradition of openness. "They've recreated Minitel, in a way," he says.

Around 80% of the new technical standards adopted in recent years were devised by American engineers and companies, he notes. He has lobbied for changes that would make the internet more accessible to non-English-speaking users. That campaign won an important victory in 2009 when ICANN, the unconventional charity which manages the internet's address system, approved a plan to start issuing domain names (including web addresses) written in Chinese, Arabic and other non-Western scripts.

Despite this decision, ICANN—more formally known as the Internet Corpo-

ration for Assigned Names and Numbers—is a particular bugbear of Mr Pouzin's. Based in California and very loosely accountable to America's Department of Commerce, the organisation has in recent years worked hard to become more representative of the international community it serves. But some governments would like ICANN's governance responsibilities—and those of the Internet Engineering Task Force, a loose affiliation of networking experts—transferred to a traditional international organisation such as the International Telecommunication Union (ITU), a dusty UN agency that has long regulated telephony. Handing things over to the bureaucracy of the ITU, however, might slow the development and adoption of new standards. As a result, many countries have concluded that the American-led status quo is the least bad option. Mr Pouzin wonders if forming a new organisation by splitting and combining existing international bodies would be a better approach.

Instinctively an engineer rather than a campaigner, however, his main concern is that the underpinnings of the internet should not become fossilised, but should continue to evolve and improve. "The internet was created as an experimental network," he says. "It still is one." He supports researchers in America, Ireland, Spain and elsewhere who are devising ways to make it more efficient and more secure. "The internet itself has not changed in 30 years," he says. "A century from now it must not be the same." Mr Pouzin may have helped make the internet what it is today, but that does not mean he wants it to stay that way. ■

Offer to readers

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Nigeria

Why northerners feel done down

KANO

A terrorist insurgency has deepened a poor region's already grave problems

THE roads are thick with traffic and pavements throng with hawkers selling phonecards, sunglasses and leather sandals. At night, street corners are lit up with a red glow from grills cooking spicy meat. But the bustle of Kano, Nigeria's second-biggest city and the commercial capital of the north, masks an uncomfortable reality: northern Nigeria is in steep decline.

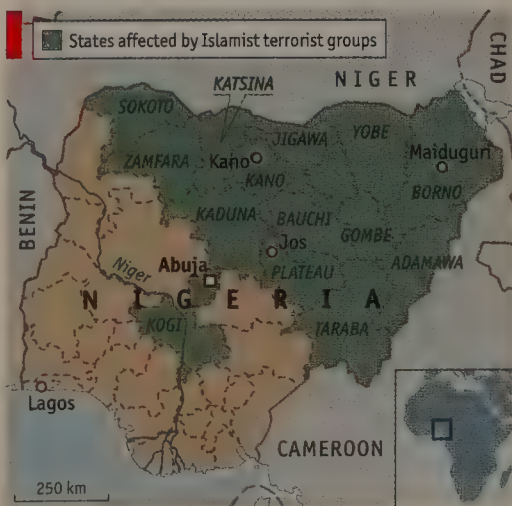
An increasingly bloody insurgency waged by Boko Haram, an Islamist terrorist group, has sharpened frustration over the disparity between the jobless north and the oil-rich south. In recent months Kano has been relatively stable, following a military offensive to contain the terrorists. But though the pause in violence has brought people back onto the streets, they have rediscovered other problems. "Stoves are gone, people selling beer have gone, there is no market, there are few customers and I haven't been able to save any money in months," says Chineu Abason, sitting in her wooden-shack restaurant in Sabon Gari, a mainly Christian district, where Boko Haram bombs have killed scores of people this year (see picture above).

The fear of terrorism continues to cast a long shadow over the city and across the north. Bombings, kidnappings and bloody assaults by Boko Haram, as well as the army's efforts to keep a lid on the fighting, have deterred investment. Farming, the north's main source of income, has been hamstrung. Consumer-goods companies say that insecurity has forced them to retreat from some areas. Commercial drivers

say dangerous roads and military check-points add 5-10% to their costs.

Despite a construction boom across Nigeria, many foreign companies avoid the north. In February seven employees of Setraco, an international construction company, were abducted in Bauchi state by Ansaru, a group that splintered from Boko Haram, prompting an immediate shut-down of the firm's operations up north. PZ Cussons, the maker of Imperial Leather soap, and Guinness Nigeria are hanging on but have been hit by the conflict, too.

Even before Boko Haram's insurgency intensified nearly three years ago, the north was struggling. Unreliable electricity, cheap Chinese imports, smuggling and counterfeit goods have made life hard for local companies. Vast spaces on Kano's edges have become industrial graveyards.



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In rural areas the picture is bleaker still. Poor education puts off investors seeking skilled labour. Whereas the literacy rate in Lagos, Nigeria's commercial capital on the coast, is 92%, in Kano it is 49%. In the north-eastern state of Borno, where Boko Haram got going, it is 15%. Without better education, the region will struggle to attract investment or create jobs. The malaise is a useful recruiting tool for terrorists, as well as politicians with their eye on the top.

Northerners habitually complain that politicians have made personal fortunes from the booming oil industry in the south, while failing to share its benefits. Mutterings of a north-south divide have grown louder with the prospect of President Goodluck Jonathan, a southern Christian, running for a second term in 2015. Northerners resent what they see as a violation of an unwritten rule that the presidency should rotate every two terms between the largely Muslim north and the mostly Christian south. A southerner has held the post for 11 of the past 14 years.

Nigeria's finance minister, Ngozi Okonjo-Iweala, insists that the government recognises the north's need. Nigeria has courted \$20 billion of foreign direct investment in the past three years, 10% of the African total. Yet most investors set up shop in Lagos. "When we advise investors coming to Nigeria, they don't even talk about the north," says a South African banker in the plush Hilton Hotel in Abuja, the capital, which lies between north and south. "It simply isn't a consideration. It's the sad truth and it isn't about to change."

There are few signs of revival in Kano, though it is nearly as big as Lagos. "Shoprite OPENING SOON" is splashed on a red-and-orange sign where the Ado Bayero Mall, the north's first modern shopping centre, is going up. It has been a long wait: Shoprite, a South African food distributor, has been operating in Lagos since 2005.

Kano's state governor, Rabi'u Musa ►►

► Kwankwaso, has poured millions into infrastructure. Taxis weave through huge concrete columns that will eventually support a flyover. But while three-lane highways are being built, feeder roads from rural communities remain decrepit. A multi-million-dollar development, the Mega Five Projects, will have three posh housing estates and two transport terminals.

Such projects make little sense when many northerners, struggling to make a living, are deciding to leave Kano in search of better prospects—down south. “It is the only logical way for the government,” says the owner of a big construction company. “Visible development gives the impression of stability and progress.” But it will not be enough to close the gulf between Nigeria’s two halves. As a result, northerners are increasingly resentful. ■

Energy in South Africa

Fear of the dark

JOHANNESBURG

Firms are asked to use less electricity even though the economy is weak

TELEVISION viewers in South Africa have become used to advertisements asking them to be frugal with electricity during the peak evening hours. In one commercial a swimming-pool pump in human form is kicked out of a house party: “pool pump not wanted” is the tagline. In another, a water heater is given the cold shoulder.

The campaign is on behalf of the Electricity Supply Commission, universally known as Eskom, the state-owned firm that produces 95% of South Africa’s electricity. It is unusual in that it does not appeal to thrift or greenery as reasons to conserve energy. Its main message is blunter. It says that the sparing use of appliances is needed to keep the lights from going out. The margin between electricity supply and peak demand has been perilously thin since 2008, when power cuts brought many mines to a standstill. So narrow has the gap now become that the chance of another spell of blackouts is worryingly high.

On November 19th Eskom was forced to ask its biggest industrial customers to cut their consumption by 10% at peak time. The curb was meant to last for ten days, so Eskom could be sure to avoid “load-shedding”, the polite term for scheduled power cuts for all users. It ended after only two days; Eskom said its spare capacity was much improved. But bitter complaints from industry about lost production owing to the curbs on electricity may also have influenced the decision.

Though short-lived, the latest emergen-

cy is a reminder of how perilously unreliable South Africa’s power supply has become. Eskom has to patch up so many of its ageing power stations that it has taken more out of service than might normally be considered prudent, even during the quieter summer months. The risk was that any problems with the plants that remained in service would trigger a temporary shortage. So it proved.

The deeper causes of today’s shortfall originated a decade or so ago. Ample power capacity that was built up in the 1970s and 1980s bred complacency. Eskom was forbidden from building power stations for several years to make room for potential rivals. That was a creditable policy but it went awry. The government took its time to set out terms for would-be energy firms. When they appeared, private capital lost interest.

The delay was costly. It takes around seven years to build a power station. By the time the ban on investment by Eskom was lifted in 2004, a crisis was looming. A new coal-fired power station in Limpopo province, in the north, will eventually add 10% to capacity but it has been delayed by strikes and tardy contractors. Meanwhile the existing plants are showing their age.

The wonder is that power supply has become stretched at a time when commerce is so listless. Figures published on November 26th showed that GDP grew between June and September at its slowest rate since 2009. It is strange that a country whose exports depend heavily on energy-intensive industries, such as carmaking and mining, has been so careless about power. Fitful electricity may now be as much a turn-off to much-needed investment by foreign companies as red tape and strikes. But then South Africa is a strange country. Few other places that also suffer from energy shortages are likely to have quite so many swimming pools. ■



Not the nicest spot if the lights go out

Kenya and its Somalis

Go back home!

NAIROBI

A Kenyan plan to get rid of Somali refugees is harsh and ill-designed

IT IS time for the 500,000-odd citizens of Somalia living in Kenya to go home—that is, according to Kenya’s interior minister, Joseph Ole Lenku. He visited the sprawling Dadaab camp near Kenya’s border with Somalia on November 23rd to tell the nearly 400,000 refugees there that it was closing time. “The time for debate” over whether it was safe for them to return to their conflict-ridden country was past, he told them. “There is no turning back on the process [of repatriation] of refugees.”

This has rattled the UN’s High Commission for Refugees (UNHCR). While progress in some parts of Somalia is stumbling ahead after two decades of civil war, the country remains one of the world’s most dangerous. Refugees have rights under international law; strict conditions must be met before they can be sent home. Normally a survey would be conducted to establish whether they think it is safe to return. Little of this appears to have happened before a deal was signed on November 10th between the UNHCR and the governments of Somalia and Kenya.

“We have quite a few spontaneous returns,” says Raouf Mazou, who heads the UNHCR in Kenya. The agreement was meant to “facilitate” such voluntary returnees, he insists, rather than deport any of those who wished to stay.

Human-rights groups are concerned that the UNHCR has been pushed into an agreement that looks harmless on paper but will be used to drive unwelcome refugees back over the border. Kenya’s government is keen to look tough on Somali immigrants in the wake of a recent terrorist attack in Nairobi, the capital, for which the Shabab, a Somali militia allied to al-Qaeda, claimed responsibility.

But where, then, would the refugees go? Mr Mazou says that three places in southern and central Somalia have been chosen: Luuk, Baidoa and the port of Kismayo. The UNHCR has a duty to protect the returnees, which it says it will do with the help of Somalia’s government. But Hassan Sheikh Mohamud, Somalia’s president, has no authority over Kismayo. An erstwhile stronghold of the Shabab, it is now run by a former warlord, Ahmed Madobe, who rejects Mr Mohamud’s authority. The UNHCR has no international staff at any of the trio of places because they are not considered safe enough. If the refugees are kicked out of Dadaab, they may seek a haven elsewhere—but not in Somalia. ■

Egypt's Islamists

Many stripes

ALEXANDRIA

Can Egypt's Salafists take on the Islamist mantle?

AS THE authorities rounded up another bunch of Muslim Brothers in Alexandria on November 23rd, Bassam el-Zarqa, a prominent Salafist from the city, was in an interview criticising the “deep state”, as Egypt's security establishment is known—even though his part of the Islamist movement is allied to the military-backed government that overthrew Muhammad Morsi, the country's Brotherly president, five months ago. In Alexandria, the country's second city and home of Egypt's Salafist movement, the Islamists are in an awkward spot.

Since ousting Mr Morsi, the government has hounded the Brotherhood, referring to its loyalists as “terrorists”, to the point of removing them from above-board politics altogether. But other Islamists roam freely, including the Salafists, a devout lot who hark back to the time of the Prophet Muhammad for how to live.

Alexandria is a good place to see how the Islamists in general are faring. The Nour party, the biggest of the Salafist outfits, backed the coup against Mr Morsi. It grew out of the Salafist Call, a religious movement founded in Alexandria by university students. While the Muslim Brothers embraced political activity, its members shunned it until 2011. It looked to Saudi Arabia as a source of inspiration.

Officials from the Nour party say they have good relations with the military-backed government. None of its members has been arrested for being Islamist. “The struggle today is about benefits rather than ideology,” says Mr Zarqa, a vice-president of the party. Indeed, the resurgent deep state has gone after secular dissidents as well. On November 27th it arrested a group of young men and women in Cairo who were protesting against the military trials of civilians, among other things.

The government wants the Nour party to take on the official mantle of the Islamists in the enforced absence of the Muslim Brothers. It has a smoother veneer. Its publicists are well-spoken. Especially when talking to Western journalists, it avoids contentious issues such as the imposition of *sharia* law and its harsher punishments, such as stoning for adultery. But among Salafists the decision of the Nour party's leaders to embrace politics and then to ally themselves with a military government that has chased down fellow Islamists is controversial. Party members admit they have lost support.

Yemenis and Saudis

Love across the line

SANA'A

The geopolitics of illicit love

FOR days Yemen has been abuzz with talk of Huda and Arafat. Huda al-Niran, a 22-year-old Saudi woman, fell in love with Arafat Muhammad, a Yemeni, while he was working in Saudi Arabia. In October the couple fled to Yemen after her parents refused to let them marry, but Ms Niran was arrested for entering the country illegally. She seemed set for a quick trial and deportation. Then their love story became a *cause célèbre* for young Yemenis, who view it as a version of Romeo and Juliet in the south-west of the Arabian peninsula. On November 26th Ms Niran was freed into the custody of the UN for a period of three months, allowing her to seek refugee status.

Yemenis have been gripped by the saga for several reasons. The country's deep-rooted conservative traditions are slowly changing. Young middle-class men and women have grown increasingly willing to challenge their families' expectations, with many now bidding to choose their own spouse rather than submit to an arranged marriage. But more often than not, unlike Mr Muhammad and Ms Niran, they end up putting their adolescent relationships aside and fulfilling their parents' wishes.

Yemeni interest in the star-crossed lovers touches on geopolitics, too. The case has presented an opportunity for Yemenis to score a point against the Saudis, who want the Yemeni authorities to return Ms Niran. Many Yemenis resent their richer and more powerful neighbour's interference in their country's affairs. Moreover, the kingdom recently

deported tens of thousands of Yemeni workers after deciding to cut down on foreign labour.

Many of the Yemeni campaigners who spearheaded the protests that led to the ousting of President Ali Abdullah Saleh two years ago have enthusiastically taken up the cause of Ms Niran and Mr Muhammad, organising street protests to press the government to drop the charges against Ms Niran and grant her refugee status. They describe their temporary shift in focus from agitating for political change as ensuring the “victory of love”.

Some Yemenis whisper that public opinion might have been different if the nationalities had been reversed. “Let's face it,” says a young Yemeni. “If Huda were a Yemeni who ran across the Saudi border with her Saudi boyfriend, we'd be cursing the Saudis and demanding that they send her back.”



Don't hold them back

Many people are thus unclear what the Salafists hope to achieve. The Nour party says it does not plan to field a candidate for presidential elections expected to be held early next year. Some ascribe the party's backing for the government to its warm relations with Saudi Arabia, which backed Egypt's coup because it detests the Muslim Brothers. Others say that the Nour party reckoned it could ensure that the new constitution retains an Islamist flavour by shielding its followers from arrest.

That may be naïve. The latest draft of the constitution is devoid of the Islamist references that filled the version hurriedly adopted during Mr Morsi's tenure as president. Some of Alexandria's Islamists fear that once the police have rounded up all the Brothers, they may go after other Islamists. Others reckon that the state benefits from having a few bearded men around, so

that the generals can keep alive the fear of an Islamist menace.

Alexandrians in general are less vitriolic towards Islamists than other city people, but there is no love lost between them. The once-cosmopolitan port city is particularly wary of Islamists' conservative view of personal rights. Though human-rights folk criticise the security forces' crackdown on the Brothers, they tend not to protest too loudly, knowing that the Islamists were hardly friendly to them during the Brotherhood's brief spell in power. Few in Alexandria paid attention to the sentences of 11 years each, handed down on November 27th, to 14 women known as the “7am girls” for “incitement to violence”, but in reality for protesting on behalf of Mr Morsi in Alexandria after he was overthrown. “We fear being lumped in one group,” says Mahienour el-Massry, a rights activist. ■



France

Strident neocon, lame Socialist

PARIS

A gap is widening between the French president's decisiveness abroad and dithering at home

ON PAPER, he is one of the most powerful leaders in the Western world. Under the French constitution President François Hollande can dispatch troops abroad, as he is about to do in the Central African Republic (CAR), conduct foreign affairs as he pleases, and dissolve parliament as he sees fit. Moreover, his Socialist Party controls all levels of government, from the senate down to a majority of local councils. In diplomacy, Mr Hollande has indeed turned out to be as decisive in his exercise of power as the constitution allows. Yet, on the domestic front, he behaves with ever-shrinking authority.

In January an unexpectedly hawkish Mr Hollande dispatched 4,500 French soldiers and fighter jets to Mali, to push back an incursion in the north by rebels linked to the local branch of al-Qaeda; 2,800 French troops are still on the ground there. More recently, Mr Hollande had his jets on alert, ready to strike targets in Syria, before America's president halted matters by deciding to consult Congress first. France's foreign minister, Laurent Fabius, then took a tougher line in the latest negotiations with Iran than the Americans did, insisting on pushing for further concessions and delaying the final deal.

Now Mr Hollande is preparing to send some 1,000 French soldiers to the CAR, where lawlessness and violence, in Mr Fabius's words, "border on genocide". The French have drafted a resolution for the

United Nations Security Council, which could go to a vote in early December, to authorise a UN peacekeeping force. This could support African regional peacekeepers already there, and operate with French military backing. Jean-Yves Le Drian, the defence minister, says that he expects the French intervention in the CAR, which will add to the 400 or so French soldiers already guarding the capital's airport, to last six months.

As the French prepare for yet another foreign military adventure, there is much head-scratching about how such a decisive war leader can be so ineffective domestically. Mr Hollande's decidedly shaky grip on governing at home has been underlined by two recent episodes.

The first was his ill-judged decision in October to intervene, via a live televised address to the nation, in a court order to deport Leonarda Dibrani, an illegally resident Roma school pupil, back to Kosovo. Reacting to an outcry about the deportation, and faced with the decision either to uphold the law or flaunt it, Mr Hollande chose a third way with an offer to let the under-aged Ms Dibrani return to school in France—but without her family. This satisfied nobody, and exposed the president as an indecisive meddler.

At the same time, a bigger revolt broke out, this time over taxes. In anticipation of a new "eco-tax", which was to be a charge on big lorries using main roads in an effort

to discourage road freight, furious truckers in Brittany began commando-style attacks on automatic toll sensors. The burning and smashing-up of the sensors spread; the western Peninsula of Brittany fast became the centre of a popular revolt against taxation that drew an improbable mix of farmers, local business bosses and nationalists. In a clever propaganda coup, they adopted red woolly hats, or *bonnets rouges*, in a nod to the headgear worn during a 1675 uprising in Brittany against taxes imposed by Louis XIV.

The fiscal revolt took the government by surprise. The French are famously tolerant of high taxes, regarding them as part of a social pact that secures them good public services in return. Yet that pact has been put to the test by several years of tax increases. Even Pierre Moscovici, the finance minister, recognised that the French had "had it up to here" with higher taxes.

The government promptly backed down on the eco-tax, with Jean-Marc Ayrault, the prime minister, declaring it "suspended". This was the third retreat on a new tax this autumn. What made this surrender such an emblem of Mr Hollande's diminished authority was that it was not a mere proposal but written into law, and had passed with cross-party parliamentary support.

Mr Hollande's options are now limited. His approval rating sank to 20% in November, the lowest since Ifop, a polling group, started measuring presidential popularity in 1958. The economy shrank again in the third quarter. The president's team argues that it will take time for its efforts, on public finances and competitiveness, to bring results, and that patience will pay off.

But fretful Socialist deputies want a firmer hand now. One has urged a change of prime minister; yet it would be hard to find a pliant successor to the plodding but ►►

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loyal Mr Ayrault. Others have called for parliament to be dissolved. For now, the strategy seems to be to try to restore the prime minister's authority, thanks to a grand "fiscal rethink". This idea was cooked up by Mr Ayrault. Mr Hollande said that this could take years; Mr Ayrault has begun consultations.

Whatever relief this rethink brings may prove short-lived. Mr Ayrault says the idea is to make the French tax system "fairer", but also that he will keep the overall tax take at the same level. And rejigging the system to help the worse-off is likely to mean higher taxes for the rest, including the squeezed middle. Above all, it means yet more uncertainty about French taxes, at a time when their unpredictability is already a worrying deterrent to investment and confidence. ■

The Munich art haul

In the shadow of the Holocaust

BERLIN

An art trove exposes a legal vacuum

ONE day Hollywood will spin its yarns around Cornelius Gurlitt, the eccentric 80-year-old recluse who lived quietly for decades in a drab Munich flat amid towers of canned food and 1,406 stunning works of art. But first lawyers, diplomats and the descendants of Jews and other victims of the Nazis need their questions answered. The most pressing is what to do with Mr Gurlitt's art now.

Mr Gurlitt's case has become an international controversy since it was revealed on November 3rd. In a routine investigation, Bavarian prosecutors had entered his flat in February 2012 and found works by Matisse (pictured), Chagall, Beckmann, Nolde, Picasso and other masters. Many of the paintings appear to be among those the Nazis once confiscated from German museums as "degenerate art". Others probably belonged to Jews or other private owners whom the Nazis robbed. With their provenance unclear, the investigators kept the art but did not make their discovery public until this month.

They may have violated Mr Gurlitt's legal rights. He has not so far been accused of any crime. The prosecutor's office says that it may only investigate its original case of tax evasion. Whether the prosecutor was within his remit to hold paintings unconnected with this allegation is questionable. He will now return a first batch of several hundred paintings whose ownership by Mr Gurlitt is uncontested.

Such legalism misses the point, say others, including Jewish groups. The prosecu-

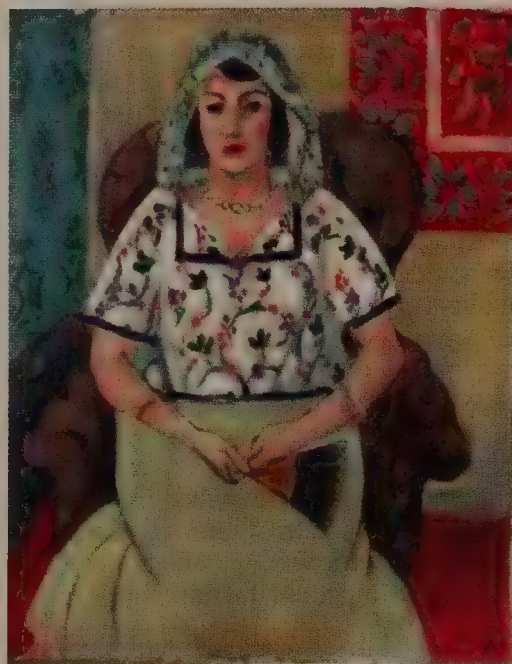
tor should have made all the art public much sooner so that victims of the Nazis or their descendants could have a look. Moreover, they say, this matter is at heart about the Holocaust and therefore not only legal but also political and moral, and should be handled by the German government.

The government has now appointed a task force to research the art's provenance. Piece by piece, it is uploading more of it to www.lostart.de, a site where victims or heirs can find works that are rightfully theirs. But that is an ad hoc solution. What the Gurlitt case has exposed is that Germany does not yet have a comprehensive answer to the problem of looted art.

In 1998 Germany and 43 other countries signed the Washington Principles pledging to search their public collections for looted art in order to restitute it. But that does not cover cases of "degenerate art", which the Nazis took out of state-owned German museums under a 1938 law, which Germany has, amazingly, never officially annulled. Nor does it cover private stashes such as Mr Gurlitt's.

Whatever Germany does now, Mr Gurlitt's case remains vexing. His father, Hildebrand, was one of four traders the Nazis commissioned to deal in "degenerate" or looted art, which makes the provenance of at least some of it questionable. After his death in 1956, his wife told at least one big lie, claiming that the collection was destroyed in the Dresden firebombing.

Mr Gurlitt inherited it in 1967. He may thus be saved by a statute of limitations of 30 years, although the attorney-general of Bavaria is now studying whether this can be lifted retroactively. An alternative would be to prove that Mr Gurlitt inherited the works "in bad faith", in which case he never properly owned them in the first place. Better still, Mr Gurlitt could voluntarily begin co-operating in the search for a solution. ■



She was part of the Gurlitt stash

Italian politics

Grande dramma

ROME

The upper house ejects Silvio Berlusconi

IT WAS Italian politics at its most extravagantly theatrical. Inside the senate on November 27th, as it prepared to vote on Silvio Berlusconi's expulsion, some of his party's female lawmakers appeared dressed in widow's black. Outside, the former prime minister told a noisy (but notably small) rally of his supporters that it was a "day of mourning for democracy".

Ignoring the histrionics, a majority in the upper house defeated a string of motions intended to block Mr Berlusconi's removal following his conviction in August for tax fraud. As a result, the longest-serving prime minister since the second world war, a man who has dominated the public life of his nation for more than 20 years, no longer has parliamentary immunity.

One of Mr Berlusconi's many lawyers, Franco Coppi, said the idea his client might go to jail was "unreal". Unlikely, perhaps. But no longer impossible.

The day before the vote, Mr Berlusconi's party—newly relaunched under its old name of Forza Italia (Come on Italy)—abandoned Enrico Letta's coalition government and voted against the 2014 budget. But they could not stop it: a number of Berlusconi defectors, regrouped in a new centre-right party under the leadership of Angelino Alfano, continues to support the Letta government.

Mr Berlusconi huffed and puffed to avoid expulsion. He urged the president to grant him a pardon; beseeched the senators of the left and the maverick Five Star Movement (M5S) to change their minds so that they would not one day feel "ashamed in front of [their] children"; warned threateningly that the demonstration on the day of the vote would be "just the beginning" and demanded a retrial, claiming to have vital new evidence and seven new witnesses. (His lawyers said later there were even more.)

Why such desperation? Mr Berlusconi himself acknowledged that the senate could remove him from parliament, but not from politics. Beppe Grillo of the M5S has shown the way: he too was convicted of a criminal offence (manslaughter arising from a road accident) and is not a member of the legislature, yet he still exerts a decisive influence on the M5S from outside.

Mr Berlusconi's efforts to remain in parliament suggest that, unlike his lawyer, he thinks the threat of jail is real. Though given a four-year sentence for tax fraud, Mr Berlusconi benefited from a pardon that ►►

Latvia

Badly built

RIGA

The consequences of a tragedy

FIFTY-FOUR people were killed and dozens injured when a supermarket roof in Latvia's capital Riga collapsed. The tragedy was the worst in the Baltic country's peacetime history. Many felt it exemplified the corruption and weakness in parts of the state administration that have plagued Latvia since it regained independence in 1991. Was the building constructed in defiance of building codes? Or was a winter garden on the roof poorly drained, so that sodden earth brought concrete beams crashing down on crowds of shoppers?

The answers should probably come from the Riga municipality, the public body directly responsible. But the government's lacklustre response also epitomised its main failing: a detached and unsympathetic approach to Latvians' human and daily concerns. That seems to be why the prime minister, Valdis Dombrovskis, suddenly tendered his resignation on November 27th after an unscheduled meeting with Andris Bērziņš, the president.

Mr Dombrovskis's coalition governments have piloted the country through economic storms following a banking collapse in 2008. Despite a more than 20% peak-to-trough fall in GDP, he won re-election in 2010. Now the economy is the fastest-growing in Europe and Latvia will adopt the euro on January 1st. But the cost has been high. Hundreds of thousands have emigrated. Those who remain yearn for better leadership. They will probably get the same old faces.

► wiped three years off sentences for offences committed before 2006. He is a first offender. And he is over the age of 70. But neither of the first two factors will apply if he is convicted again. He is appealing against a seven-year sentence for paying an underage prostitute and abusing his position as prime minister to cover up their relationship. He is due to go on trial again next year charged with bribing a senator to change sides in parliament.

An even greater threat for Mr Berlusconi is that he is being investigated for allegedly perverting the course of justice and could soon be made a suspect in yet another inquiry. In Italy, the risk of being jailed before being found guilty is considerable: according to the latest comparable figures, the proportion of prisoners on remand was the highest in Europe after Turkey and some micro-states. Mr Berlusconi has reasons to be nervous. ■



Bulgaria

A nightmare for all

SOFIA

Bulgaria is struggling to cope with Syrian refugees

"THIS is a nightmare, I want to go back to Syria," says Youssef (not his real name), who has fled from his war-torn country and is now in a squalid refugee camp in south-eastern Bulgaria. He is shocked by the lack of urgently needed medical help, the scarcity of food—and the sight of crumbling old buildings where up to ten desperate families share a single room, and ten such rooms have the use of only one leaky toilet.

Youssef is one of thousands of Syrian refugees in Bulgaria, the poorest European Union country. Dozens more are crossing the border with Turkey every day. Around 10,000 migrants (two-thirds of them from Syria) have arrived so far this year, a seven-fold increase from last. Authorities have basic facilities ready for only half of them.

The influx caught the government unprepared. It is now rushing to build new shelters and improve the miserable conditions at the existing ones. It has asked the EU, the Red Cross and other international organisations for financial assistance.

The government is also building a controversial 33km (21-mile), 3-metre tall fence in the mountainous region of Elhovo, near the border with Turkey, where about 85% of the illegal immigrants are crossing. According to officials, the idea behind the "temporary engineering installation", which has a price tag of €3m (\$4m), is to redirect refugees to official border check-

points. The UNHCR, the UN's refugee agency, thinks it is counterproductive. "Introducing barriers, like fences or other deterrents, may lead people to undertake more dangerous crossings and further place the refugees at the mercy of smugglers," says Adrian Edwards of the UNHCR.

Other European countries have erected similar barriers to deter immigrants from Africa and the Middle East. In October Turkey started building a 2-metre-high wall along part of its Syrian border. Last year Greece built a 10.5km barbed-wire fence at its border with Turkey. Because of the Greek wall, smugglers have increasingly concentrated on moving people into Bulgaria. "It seems that there will be a competition between the walls in Bulgaria and Greece," says Tihomir Bezlov at the Centre for the Study of Democracy, in Sofia. "The main problem, as the experience with other borders shows, is that a wall cannot stop people who are ready to do anything."

The wire fence is just one of a series of measures taken by the government in recent weeks that signal a tougher stance on illegal immigration. The interior ministry has sent a couple of thousand police officers to patrol the Turkish border and is planning to build "accommodation centres of the closed type"—a euphemism for prisons—for immigrants. In recent weeks Bulgaria has sent back hundreds of illegal immigrants from Syria, a move strongly ►►

criticised by the UNHCR.

The surge in refugees is igniting xenophobia in a traditionally tolerant society. On November 9th skinhead extremists beat up a Bulgarian Muslim, apparently mistaking him for a Syrian. Earlier in the month the stabbing of a 20-year-old shop clerk in the centre of Sofia led to the arrest of an illegal Algerian migrant a couple of days later and protests by nationalists.

Far-right parties are on the rise. According to a poll by Alpha Research, 83% of Bulgarians see the influx of refugees as a risk to national security. Support for Ataka, an ultranationalist party, which has 23 seats in parliament, has doubled in the past two months. And on November 9th a new nationalist party was founded, promising to "clean up the country of this scum, these immigrants". ■

Ukraine and the EU

Stealing their dream

KIEV

Viktor Yanukovich is hijacking Ukrainians' European future

IT WAS billed as a history play, but turned into a Ukrainian-style farce. Only ten days ago Ukraine, which has spent most of its 22 years as an independent country floating between Russia and Europe, at last seemed to be on the path towards Europe. Viktor Yanukovich, the president, who had tried to rig elections in 2004, this time played the part of a statesman on an historic mission. The performance was to culminate on November 29th with the signing of an association agreement between Ukraine and European Union leaders.

The role appeared too much for Mr Yanukovich: a week before the summit, he rewrote the script. He halted the talks with the EU, and turned to Russia instead, sparking mass protests from Ukrainians who feel their future is being gambled away.

Mr Yanukovich blamed his change of mind on Russia's economic pressure and European stinginess. He claimed that he

had not expected Russia to carry through its threats to impose sanctions on Ukraine's imports, even though Mr Putin never gave him reason to doubt the Kremlin's resolve. Mr Yanukovich evoked laughter with his attempt to justify his U-turn by the need to protect the nation's vulnerable citizens—as he did with his "concern" for private business. Petro Poroshenko, a businessman and a proponent of Ukraine's European integration, whose exports of chocolates to Russia have been hit hard, says his business suffers more from being raided by Ukraine's security and tax men than it does from Russia's sanctions. In fact, one of the main reasons why many oligarchs support Ukraine's deal with the EU is because they see it as a protection against Mr Yanukovich.

Mr Yanukovich's change of mind stunned the Europeans. It should not have done. His initial move towards Europe was not a strategic choice based on the long-term interests of his country, but one based on the short-term interests of Mr Yanukovich and his family, which, unlike Ukraine's economy, seems to be thriving. At a meeting with newspaper editors some time ago, Mr Yanukovich was asked which path Ukraine should choose. His answer was apparently the path of money.

With Ukraine's economy on the verge of bankruptcy and a presidential election looming in 2015, the need for funding has become acute. Winning the election seems to be a question of life and death for Mr Yanukovich. If he does not win, he may not only lose his wealth, but also swap places with Yulia Tymoshenko, a former prime minister and his arch rival who is now in jail. Signing a deal with the EU may have offered Mr Yanukovich his best chance of defeating the opposition fairly, but he apparently preferred tried and tested methods, which include a mix of electoral bribery and a crackdown on dissent.

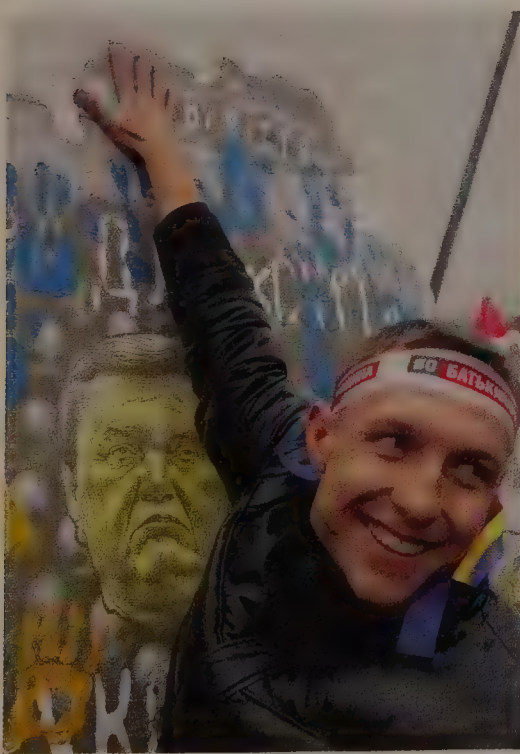
Unwilling to launch economic reforms,

cut spending or tame the appetites of his cronies, Mr Yanukovich proceeded to trade the country's most valuable asset: Ukraine's geopolitical position. "The talks with the EU were an auction. It was a position of a pimp who is offering Ukraine up for sale," says Mr Poroshenko. Mr Yanukovich let it be known that, if Europe wanted a modern, democratic Ukraine, it needed to pay. His price was \$160 billion by 2017.

European politicians were aghast at such blatant blackmail; Mr Putin seemed happy to haggle. It is not clear what he and Mr Yanukovich agreed during their secret meeting in early November—the deal is said to include cheaper gas, credits and lucrative business contracts—but not, it is rumoured in Kiev, a requirement that Ukraine join a proposed new customs union with Russia. Whatever the understanding, it has persuaded Mr Yanukovich to distance himself from the EU. Though nothing is ever final in Ukraine, Mr Yanukovich's favoured option seems to be to preserve the status quo and refrain from joining either camp while continuing to milk both—hence his new proposal of three-way talks.

A face-saving memorandum may yet be signed with the EU, but the collapse of the association agreement could be a blessing in disguise for the Europeans. Teaming up with Mr Yanukovich, who would never have implemented it, would have only led to disappointment and re-cremations, while helping Mr Yanukovich get re-elected. Instead, the collapse brought pressure on Mr Yanukovich from educated middle-class Ukrainians who feel that their future has been hijacked and their dream stolen. Haunted by the memories of 2004, Mr Yanukovich may try to crack down, but time is against him.

On November 24th tens of thousands of Ukrainians went to the streets in support of Ukraine's European course. More protests are planned after the EU summit. Coming nine years after the Orange revolution, which failed to realise its promises, these protests are by a younger generation and aimed at both Mr Yanukovich and the entire political class. For them the choice between the Soviet past and a European future is non-negotiable. ■



He wants to be part of history, too



Charlemagne | The new Hanseatic League

Britain excavates an old alliance in Europe's liberal, free-trading north



A WALLED city-within-a-city once stood on the site now occupied by London's Cannon Street station. From the 15th to 17th centuries, its counting houses, guildhall and wharves echoed to a babble of Germanic languages. It connected London with a chain of other *Hansa* trading posts strung along the shores of the North and Baltic seas. These shared a common legal system and sheltered each other from tariffs and customs restrictions. For centuries the Hanseatic League's cogs and hulks plied the inky waves, pregnant with cloth, timber and furs.

Even today, cultural similarities betray the old links: gabled merchants' houses and pubs serving eel and herring are found on damp, blustery coasts from East Anglia to Estonia. The mercantile spirit lives on, too: Britain, Germany, the Netherlands, the Nordics and the Baltics share a taste for balanced books and free trade. Most underwent economic reforms before the euro-zone crisis and have low bond yields and triple-A credit ratings to show for it. Many sport prominent Eurosceptic parties such as the True Finns, Alternative for Germany and the UK Independence Party, which channel voters' anger at being yoked to Europe's languid, unreformed south.

The kinship is not lost on British politicians. In January David Cameron, the prime minister, gave a speech in London (near the site of the trading post, as it happens) in which he pledged to overhaul Britain's EU membership and, if re-elected with a majority in 2015, put the result to an in-out referendum. He pleased northern allies by sketching a vision of a leaner, more competitive Europe in the interests of "the entrepreneur in the Netherlands, the worker in Germany, the family in Britain". The EU should spend less and concentrate on trade-boosting measures, he argued.

This has spurred excited talk in Westminster of a northern alliance—a new Hanseatic League, as it were. The British government's review of the balance of powers between Brussels and London has attracted widespread interest abroad, note diplomats. Separately, the Dutch held their own review, which concluded that Europe should integrate less and liberalise more; music to British ears. And a template for an alliance already exists: since 2011, Mr Cameron has convened an annual "Northern Future Forum" of Nordic and Baltic states.

Such designs are products of political necessity. The task before those British politicians, like Mr Cameron, who want to stay in the EU is to persuade Eurosceptic voters and MPs that the ongoing integration of the euro zone will not sideline Britain. So for the prime minister and his allies, a division of Europe into pro-British, free-trading northerners and statist southern farmers is more convenient than one of euro ins and outs.

Partly, this scheme is so much wishful thinking. It faces two problems. The unique virulence of Britain's Euroscepticism worries its neighbours. A meeting in London earlier this year left German MPs aghast at the anti-EU views of their British counterparts. This is exacerbated by doubts, sown by Mr Cameron's speech, over whether the country will even remain in the EU. It "would certainly be even more influential among the Northern Lights if it had all the lights on all the time," says Alexander Stubb, Finland's Europe minister, in a diplomatically gnomonic nod to Britain's patchy commitment to the union.

And although the Hanseatic states share trading traditions, their priorities differ. Unlike Britain, Germany, the Netherlands, Estonia and Finland use the euro, so are inextricably bound to Europe's troubled south. Latvia will join on January 1st 2014 and Poland hopes to follow. And although the states around the North and Baltic seas share fiscally conservative instincts, the likes of Poland and Lithuania receive too many transfers to want to cut the EU's budget. On foreign policy, Britain is much closer to nuclear-armed France than to its non-interventionist German and Nordic partners. On freedom of movement, too, Britain's allies are divided. That will surely frustrate Mr Cameron's bid—unveiled in a newspaper article on November 27th—to limit internal EU migrants' access to benefits.

Yet the new alliance has its uses nonetheless. Though bound together economically, the euro-zone states are not yet a cohesive bloc. When they are at odds, Britain can take the initiative—as it has done on several recent occasions. Last year it initiated a northern campaign to give non-euro-zone states a say in the running of the EU banking union. As a result, votes in the European Banking Authority will require a double-majority of euro-zone and non-euro-zone states (a principle first touted by Open Europe, a London-based think-tank). Negotiations over the EU budget in February produced another such victory. Britain and Germany thwarted spendthrift French plans by forging a cost-trimming coalition, with the Swedes and the Dutch outdaring by demanding an even deeper cut.

Burghers with relish

With northern allies at its side, Britain has also championed EU reforms to curb overfishing, leant on the European Commission to cool a protectionist dispute over Chinese solar panels and pushed for a transatlantic free-trade deal. Such occasions show that even if Britain's clout is declining, it can still lead when circumstances permit. Its exit would strike a blow to a liberal, competitive Europe; not least as the north would lose its blocking minority in the EU institutions.

And perhaps it is a good thing that the northern partnership will never be as formal as Westminster's politicians would like. A loose, flexible alliance, it can avoid pomp and power play, and concentrate instead on the pragmatic business of making Europe richer. Just like those stolid *Hansa* trading posts of yore. ■



Scottish independence

Salmond sets out his stall

GLASGOW

The pitch for an independent Scotland has a fundamental problem

THOSE who attended the launch of Scotland's independence campaign on November 26th might have failed to detect any evidence of national oppression. No police checked their papers. Nor, if they wandered farther to shops bristling with tartanalia and blasting bagpipe music, was there much sign of a suppressed culture struggling to express itself.

A speech by Alex Salmond, Scotland's nationalist first minister, was long on management-speak. Searching for a visionary quote to headline, the best the *Herald*, a nationalist-leaning Glasgow broadsheet, could produce was: "We do not seek independence as an end in itself, but as a means to change Scotland for the better." The document that Mr Salmond unveiled, a 667-page plan for independence, was more like a corporate prospectus for a share offering than a blood-tingling cry for freedom.

Strange, because a referendum on Scottish independence will be held next September. With opinion polls showing that Scotland is leaning against breaking free from the rest of the United Kingdom, the document is Mr Salmond's big chance to turn things around. But "Scotland's Future", as it is titled, reveals a fundamental problem with the independence pitch. Contemporary Scotland is neither so successful that it can clearly afford to go it alone, nor so impoverished that it has much to rail against.

Mr Salmond aims to convince Scots that prosperity will flow from breaking a 307-year-old political union. But Scotland's economy is not exactly stuck in a cul-de-sac. As "Scotland's Future" boasts, output per head in Scotland is 99% of the British average and the highest in the kingdom outside London and the south-east, even before North Sea oil and gas are considered. An independent nation would struggle not because output is low but because public spending is so high.

And the toolkit that Mr Salmond offers to build a better economy resembles a set of jeweller's screwdrivers. He promises Scandinavian-style full-time child care to get more women into work, a bigger employment-tax break for small businesses and cuts to corporation tax and air passenger duty. Business organisations were dubious. Where is the accelerator? griped Scottish Engineering, a trade body. Modelling indicates that a corporation-tax rate three percentage points lower than elsewhere in Britain could raise output by 1.4% and create 27,000 jobs—but only after 20 years, and assuming competing tax cuts do not wipe out the Scottish advantage.

Gnarly economic questions remain unanswered—some, indeed, may be impossible to answer in the next year. With North Sea oil drying up, for example, nationalist hopes for a new industrial future rest on renewable energy. Mr Salmond claims in-

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vestment in this industry amounted to £13.1 billion (\$21.3 billion) between 2010 and 2013. Scotland exports between a fifth and a quarter of the electricity it produces, much of that from renewables. But the success of this industry depends on consumers in the rest of Britain continuing to shell out for expensive green power—something that is looking less and less likely.

This is but one of a myriad of items Mr Salmond will have to negotiate agreement on to construct his new Scotland. He would also have to negotiate EU membership, continued use of sterling, the division of Britain's national debt, NATO membership and much else besides. Voting for independence would be an act of faith.

Robert Young of the University of Western Ontario, an expert on secession movements, reckons that Mr Salmond needs to increase the emotional pull of independence. He is good with symbolic dates. Next year's referendum is 700 years on from the battle of Bannockburn, a famed victory over the English by Robert the Bruce. The planned date of independence—March 24th 2016—coincides with the anniversaries of the 1603 Union of the Crowns and the 1707 Act of Union.

Yet next year also brings a British heart-string-tugger: the 100th anniversary of the outbreak of the first world war. Glasgow Cathedral will host the main church service. Oddly, says John Curtice, a psephologist, surveys show that support for independence does not grow much as the strength of Scottish identity intensifies. But opposition rises sharply as the sense of Britishness increases: independence, after all, means the end of Britain.

With an emotional draw likely, the referendum will be a fight over the benefits and costs of independence. There, Mr Salmond is still short of a winning hand. ■

The economy

Firing on one cylinder

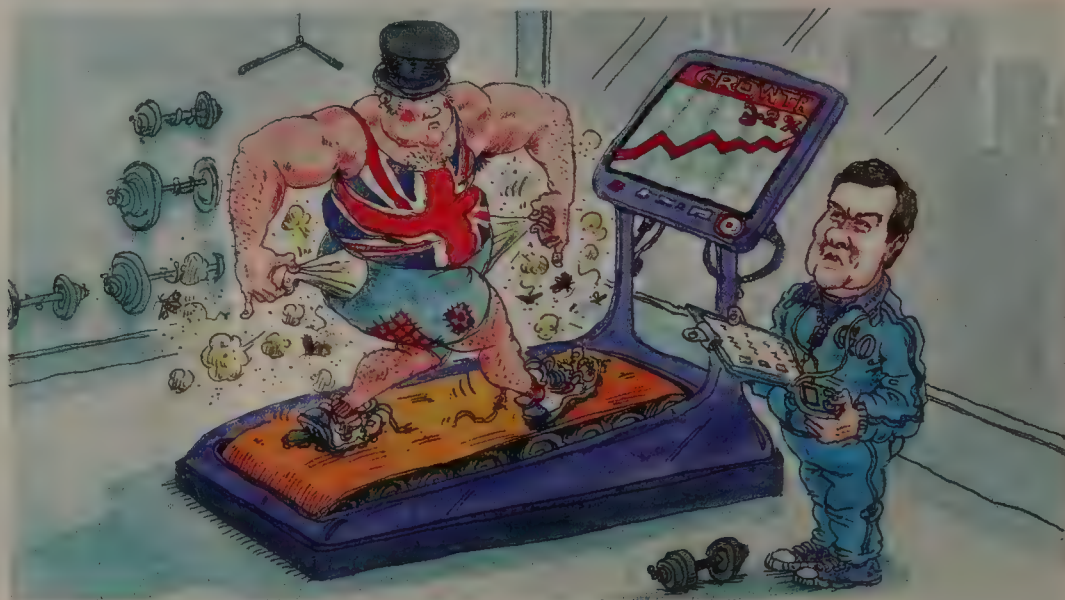
Britain's recovery is picking up steam, but its engine is weak

THE crisis that started in the dodgy mortgage markets of California, Florida and Nevada did more harm to Britain than to America. Britain had the first bank failure, and it had the biggest one. In just 18 months between 2008 and 2009 GDP dropped by 7.2%, more than it had in the 1930s. As unemployment rose, benefits kicked in and the budget deficit swelled: by 2010 Britain had the largest of any G20 nation. Given this list of woes, the fact that Britain is now outstripping all its rich-world peers seems suspicious.

But it is true. The headline figure—GDP growth—looks great. At an annualised rate of 3.2% British growth is higher than in any other G7 country (see first chart). The number of people working in Britain is, at close to 30m, the largest ever. Income-tax receipts have risen, helping the exchequer. And outgoings are falling as the number claiming jobseeker's allowance, the main out-of-work benefit, has dropped by 300,000 from its peak. George Osborne, Britain's chancellor, will finally have some good news when he delivers his autumn statement on December 5th.

But Britons hoping for lower taxes or a rush of investment spending will be disappointed. The chancellor's main message will be that the country should expect more of the same. Mr Osborne is less than halfway through an austerity drive; unless the pace of growth speeds up, five more years of cuts can be expected.

With austerity nibbling at public spending, Britain needs other reliable sources of demand. Thankfully, the largest chunks of the economy are doing well. Household spending, which accounts for 62% of GDP, is expanding steadily: it is now



just 2% below its pre-crisis high. Services, long the biggest part of British economic output, have become even more important—they now account for over 80% of it. Although finance and insurance are still in the dumps, transport, real estate and health services are growing strongly.

Yet the recovery is worrying because all other sources of demand look weak (see second chart). Official data released on November 27th showed that exports had declined by £3 billion (\$4.8 billion) in the latest quarter. Services industries may be strong at home but they are performing poorly abroad: exports have been flat in real terms since 2008. Though exports of goods are up, the overall increase, just 5%, is disappointing given the one-fifth depreciation in sterling.

Although investment rose by 1.4% in the most recent quarter it is still 25% below its previous peak. And even this slight gain was achieved by firms building up inventories. While it is good that Britain's businesses are better stocked, this is not the kind of investment that generates growth both today and tomorrow.

The lack of investment and the persistent weakness of exports sap the whole economy of strength. Britain's exporters are more productive than its non-trading firms. With exports growing more slowly than domestic consumption, the economy is becoming inward-focused and unproductive. Low investment means Britain's workers toil in grubbier offices, with rustier kit and slower computers. Productivity per worker, up 8% in America since the crash, is down by almost 5% in Britain.

The decline in workers' output is a drag on wages. With prices up by 20% since the start of 2008, median pay has fallen back to its 2003 level. The fact that the crisis has more than wiped out the bubbly years is not just a problem for the low-paid or the post-industrial north of England. Although there are some sharp losers (men who work part-time have done particularly badly) real-terms pay cuts have been felt

across Britain's pay scales and through its counties and cities.

With productivity and pay still slumping, Britain's recovery starts to look much more iffy. Wages are not rising, but mortgage and credit-card borrowing are. This debt-fuelled consumption is a return to Britain's old, pre-crisis growth model. On November 28th the Bank of England announced that the "funding for lending" scheme, which provides cheap money to banks on the condition that they lend it out, will be curtailed for mortgage lending.

Weak wages are a problem for George Osborne, too. Even if the economy does not fall back into a slump, a low-pay recovery could prove politically fatal. A recent YouGov poll for the Resolution Foundation, a think-tank, showed that although voters still blame Labour for the country's economic mess, they think the opposition will do more to ensure wages rise in line with economic growth, keep energy prices down and boost the supply of affordable housing. Mr Osborne needs to act soon in each of these areas. He will need to innovate, coming up with policies that drive investment and exports without adding to the deficit. He has built his reputation on steering a steady, austere course. In the latter half of this first term, being bold would be more prudent. ■

Leader and laggard

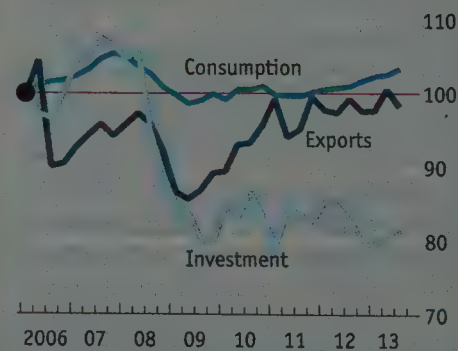
Latest quarter at annual rate, % change



Sources: Thomson Reuters; Haver Analytics; Statistics Canada; Japan's Ministry of Health, Labour and Welfare

Keep calm and carry on shopping

Components of GDP, Q1 2006=100



Source: ONS

Bagehot | A sticky pitch for the Tories

The travails of rugby league illuminate Britain's painful regional division



AT HALFTIME in the first semi-final of the Rugby League World Cup, on November 26th, the England fans thronging Wembley Stadium were in good heart. Their team of brawny Yorkies and Lancastrians was fighting hard against a tough New Zealand side. The atmosphere was exhilarating. The only cloud on this bright autumn day was the beer. "Lager! They've only got bloody lager!" said Phil, an aggrieved Mancunian sipping at the urine-coloured fluid. "Don't they know northerners drink bitter?"

Northerners also like grumbling. In the bowels of Wembley, where the fans of northern England's trademark game had gathered for beer and burgers, came a merry chatter of complaint. "Lost momentum, haven't they? Have to crack on second-half," "Bloody Kiwis!" And, inevitably: "£4.70 a pint! I can get this for £1.70 in Oldham/Wakefield/Castleford/St Helens."

Britain's main team sports, football, cricket and rugby, have always reflected the big tensions in society: conflicts over wealth and class, of north against south. Only rugby has been rent by them. It happened in the late 19th century, when a class-infused row over the compensatory payments being made to working-class players—so-called "broken time" payments—led to a break-away by northern clubs and the emergence of a rival code. Rugby union, the established game, remained amateur, patronised by royalty, played by public schools and strongest in and around Edinburgh, London, Wales, the Midlands and south-west. The upstart rugby league was semi-professional, working-class and concentrated in the pit towns of Lancashire and Yorkshire.

So it has remained. Despite repeated efforts to spread the code—with some success abroad—the professional British version is almost exclusive to the "M62 corridor" connecting Liverpool in the west with Hull in the east. It also retains its original working-class culture, in which union and the south are viewed with a mixture of bafflement, condescension and resentment.

The geographical divide between rugby union and rugby league does not perfectly correspond to the divide between Britain's post-industrial north and services-oriented south (south Wales, by this economic yardstick, ought to play league—as it probably would have done if rugby's 19th-century rulers had not turned a blind eye to the broken-time payments Welsh players were also collecting). But it is close enough to find in rugby an il-

lustration of two big trends in Britain. The first is the ever-growing economic dominance of the south. The second, more troublingly, is the cultural and political gulf this is driving.

Not long ago, professional rugby league was richer, faster and better run than amateur union. During the 1980s and early 1990s league clubs often poached union stars. Appropriately, many came from south Wales. But in 1995 rugby union turned professional, and the exodus was reversed. Union clubs, especially London-based ones such as Saracens, Harlequins and Wasps, attracted rich investors. In prosperous times union salaries soared; so did the former amateur code's popularity, on the back of its more frequent and intense international contests. The turncoats returned to union; to the horror of league fans, home-grown stars followed them. In 2007 Chris Ashton, a 20-year-old prodigy, left Wigan, the greatest league club, for union and a tenfold wage rise.

In an effort to compete, league clubs became savvier. Yet their efforts have been blighted by cultural resistance—union fans tend to be as unfairly rude about league as vice versa—and inclement economics. The wealth gap between north and south is growing: between 1997 and 2012 the median wage in Wigan rose by 38%, compared with over 60% in much of London. No wonder league crowds are smaller, ticket prices lower and investors scarcer than in union. Last year the code's superleague tournament attracted no sponsor. On November 20th the London Broncos—the only top league side outside the north—announced plans to go into administration. Instead of spreading or, as some had predicted, fusing with union, top-flight rugby league is shrinking.

A greasy political ball

League fans feel hard done by. John Prescott, a former Labour deputy prime minister and ardent Hull Kingston Rovers fan, spoke for many when he claimed union enjoyed an unfair advantage because of the "north-south divide". Not that it ever hurt him: the hardening feelings of northern resentment and dislocation Mr Prescott referred to are turning out well for Labour.

The cities of the north have long been left-leaning—Labour has held Wigan since 1918—yet not exclusively so. Until the 1980s, when the Conservatives last enjoyed big majorities, they regularly won seats in Manchester and Liverpool. Now they hold not a single council seat in those cities. Labour has a similar problem in the south, but the majorities won by New Labour in 1997, 2001 and 2005 suggest that is reversible. The northern antipathy to Tories appears increasingly cultural. In much of the M62 corridor, they are hardly in the game. In Manchester Withington, a Tory seat until 1987, they trail a distant third to Labour and the Liberal Democrats. This exile is self-perpetuating: the longer the Tories are absent from the north, the more they will be seen as a party of the south.

This division is making Britain harder to govern. Even if the Tories secure all their 40 target seats at the next election, due in 2015, they may have a majority of only around 20 seats. Yet overcoming a cultural bias—as rugby fans know—is hard. It will take the Tories more than a high-speed train line—their main answer to the north-south divide—to win the love of the north.

One suggestion is to devolve power to northern cities. That might make their politics more pragmatic and less tribal. Yet Bagehot has a more modest suggestion for the Tory prime minister, David Cameron. The last Conservative leader to attend rugby league's great occasion, the Challenge Cup final, was John Major. Mr Cameron, a union fan, should book himself a ticket. ■



Weaponry and espionage

A shot from the dark

As formidable munitions become easier to conceal and use, the West is intensifying efforts to find out who has them

BY FAR the world's fastest torpedo, Russia's rocket-powered VA-111 Shkval (Squall) can slice through the sea for more than 11km at a speed above 370 kilometres per hour. It packs a 210kg warhead and cannot be dodged or stopped by the West's big warships. Christopher Harmer, a commander in the US Navy until 2011, says vessels must therefore remain beyond the Shkval's "pretty nasty range", or strike the enemy above or below water quickly enough to prevent a launch.

No wonder, he says, that the West tries to keep tabs on each model which leaves its manufacturer, Dastan Engineering, a Russian-owned enterprise in Kyrgyzstan. That is hard: unlike big strategic missiles, the Shkval, 8.2 metres (27 feet) long, fits in an ordinary lorry. The resources used to monitor these facilities cannot be revealed, says a former Western naval chief. But, he adds, given the Shkval's power, "Why wouldn't you choose everything you had?"

The tracking of Shkval exports is but one part of a broad and increasing effort by the West to track a class of "showstopper" weapons that are both rare and easy to hide. Russia and other countries have stepped up the lucrative export of advanced weapons, especially missiles, designed with an eye to constraining rival Western forces, says Tor Bukkvoll, head of the Russia programme at Norway's De-

fence Research Establishment, a defence-ministry body. Such "area denial" munitions allow an attack to be launched without the giveaway of first having to amass troops or hardware.

These weapons can be user-friendly enough even for non-state groups. On July 14th 2006 Hizbullah militants in Lebanon hit an Israeli corvette more than 15km offshore with an Iranian-made C-802 anti-ship missile, killing four sailors and severely damaging the warship. If Israel had known that Hizbullah possessed this weapon, the corvette's automated countermeasure systems would not have been switched to standby and the attack would have failed, says Alex Tal, a former head of Israel's navy.

The subsonic C-802 is not even particularly formidable. It is an old variant of a Chinese missile. Newer anti-ship or land-attack missiles fly faster and farther, and dodge interceptors. Their solid fuel means that they can be launched discreetly on short notice, Mr Tal says. Older types such as China's widely exported Silkworm missiles require lengthy mixing and loading of volatile liquid propellants, a process which can be spotted from planes or satellites. With the newer models, the satellites have to keep watch on lorries leaving factories, which is costly and uncertain.

Among the most feared exports are Russia's supersonic Klub (3M-54) and Yakhont

guided missiles. Faster than their Western counterparts, they can be launched from land batteries, aircraft, ships and submarines, carry large warheads, and reach targets 300km away. The Klub (called the Sizzler by NATO) accelerates to three times the speed of sound in the stretch before striking. Countries publicly known to have the Klub or Yakhont include Algeria, China, India, Syria and Vietnam.

America has "a pretty good idea" of other secret exports, because it tracks ships worldwide, says Lawrence Korb, an assistant secretary of defence under Ronald Reagan who is now at the Centre for American Progress, a think-tank. But countries without such capabilities (or close ties to America) can be left in the dark. Even top-notch spy services are uncertain about some of the most burning questions. Has Syria's Assad regime passed along some of its Yakhont missiles to Hizbullah for use against Israel? Is Iran's boast of possessing the Shkval a bluff? Do North Korean subs have it? (Some reports suggest that a Shkval was used to sink a South Korean ship in 2010.) Mr Harmer, now at the Institute for the Study of War in Washington, DC, says that keeping track of every such device manufactured is impossible.

Watching, darkly

Uncertainty over arsenals is growing as a result of increasing "clandestinisation" of munitions manufacture and transport, says Jim Thomas, a senior Pentagon official until 2007. Now at the Centre for Strategic and Budgetary Assessments, another Washington think-tank, Mr Thomas says missiles are now emerging from "dual-use" factories that also ship non-military goods, and from factories made to appear as producers of solely civilian ones. This makes it harder for "squints" (intelligence ►►

Also in this section

59 Disappointing climate negotiations

officers who study satellite and drone imagery) to identify munitions of interest.

Manufacturers are marketing and designing munitions with concealment in mind. A Moscow firm called Concern Morinformsystem-Agat has offered a system of four Klub missiles and an erector, with a control compartment for two operators, all concealed inside a standard shipping container. The "Club-K Container Missile System", can be transported and fired from a merchant ship, freight train, or lorry. An expert at a European missile-maker says, "before you could see a Klub missile from space; now you can't—you need spies."

Israel already relies heavily on human sources to detect arms shipments to its enemies, says Shlomo Brom, a former intelligence officer and retired head of strategic planning at Israel's General Staff. This is partly because Israel does not have enough satellites to monitor all the far-flung facilities where the most worrisome munitions are made. And arms shipments to Israel's adversaries, he says, are increasingly disguised as civilian products.

The "vast majority" of munitions leaving Russian ports for Syria now travel on merchant ships that call at commercial ports rather than Russia's naval base at the Syrian city of Tartus, says Farley Mesko, chief operating officer at C4ADS, an American investigative group. In September it published a report on concealed arms shipments called "The Odessa Network". Missiles are separated from their bulky launchers and transporters, and travel in containers that could just as well be carrying televisions, he says. Ten Shkvals could fit in just one container.

The spies' efforts are bearing fruit. In January, May and July Israeli air strikes destroyed Russian- and Iranian-made missiles at locations in Syria. In October Sudan's government accused Israel of bombing a weapons factory in Khartoum. Military-intelligence officials elsewhere are encouraged. They are pushing for more spies to conduct more missions.

Japan wants greater efforts to go into locating missiles in China and North Korea, says Narushige Michishita, a former specialist on the two countries' arsenals at Japan's defence ministry. His country's intelligence on North Korea's launching pads and procedures is excellent, he says, thanks largely to a 1998 decision to splurge on optical and radar satellites. But more human intelligence is now needed—North Korea has increased its fleet of "transporter-erector-launcher" lorries for Ro-Dong medium-range ballistic missiles from nine to about 50. Mr Michishita, now at Tokyo's National Graduate Institute for Policy Studies, says these can lurk inconspicuously while Ro-Dong missiles are taking on their liquid fuel—and then pull out and fire.

At least these weapons are broadly known. The next threat is arms developed

in secret, so adversaries will not even know what to look for, says Mr Thomas, the former Pentagon official. Such devices may feature targeting systems which use location co-ordinates freely available from Google Earth. This would give even small and poor attackers the chance to deliver formidable weapons accurately.

Amid the growing demand for good intelligence, smaller countries see a role in helping allies. They may not be targeted by the weapons systems in question, says Todor Tagarev, a former Bulgarian defence

minister, but passing nuggets along to bigger allies cultivates goodwill.

Outside the spy world, business is booming too. Big countries may be worried about the threat. But they see an upside too. It is their defence industries which are also the best source of counter-measures to the new weapons. Briefing an ally about threats can also be an implicit sales pitch. Seen this way, says the expert at a European missile-maker, insights from military intelligence are also part of defence-industry marketing. ■

Climate negotiations

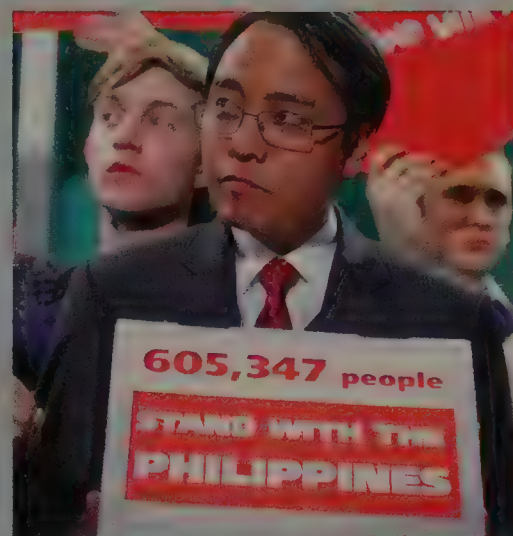
Another shabby Warsaw Pact

Not really a fair COP

NO ONE expected much from UN climate talks that wrapped up in Warsaw on November 23rd (a day late) and the event fully lived down to expectations. The best hope was that negotiations for an international climate treaty should be kept on the road towards a possible signing in Paris in 2015. And the best that can be said for the Warsaw meeting is that the delegates did not actually crash the vehicle. But the sort of treaty that will probably emerge from the process seems less and less likely to please anyone, let alone everyone.

The so-called Conference of the Parties (COP) agreed in the Polish capital that countries would make "contributions" to climate-change reduction (such as targets to cut greenhouse-gas emissions) by 2015. Some of the world's biggest polluters will doubtless do so, which is something. But it is a far cry from what Americans and Europeans wanted: actual commitments to rein in pollution. Moreover, the countries who will make these "contributions" are merely "those who are ready"—which could mean anyone or no one.

Behind these weasel words lies a split—unresolved after many years—

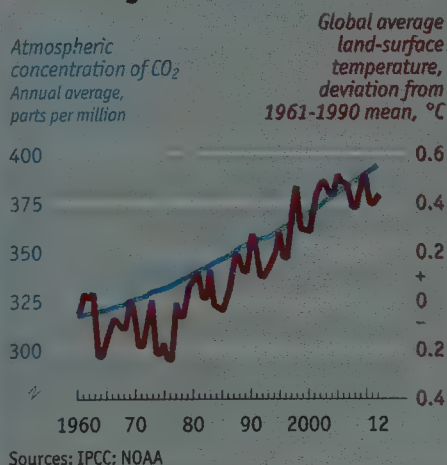


"We can stop this madness"

between developing and rich countries. The poor say rich nations are responsible for the bulk of the carbon in the atmosphere and should assume the main burden of doing something about it. The rich point out that developing economies are responsible for most new carbon emissions and must therefore promise to do more. At one point, developing countries walked out of discussions about who should pay for damage caused by extreme climate events, such as Typhoon Haiyan, which ravaged the Philippines on the eve of the meeting (the country's lead negotiator, Yeb Sano, pictured, staged a hunger strike and received standing ovations for an emotional speech).

It has been clear for some time that any treaty signed in Paris is likely to be far from comprehensive (with weak emissions targets, for example). It will also do less than most scientists think is needed to rein in the long rise in carbon emissions and temperatures (see chart). If delegates in Warsaw could barely negotiate a timetable for the talks, what chance do they have of making the harder choices required for an effective treaty?

Incubating



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Retailing

The raw and the clicked

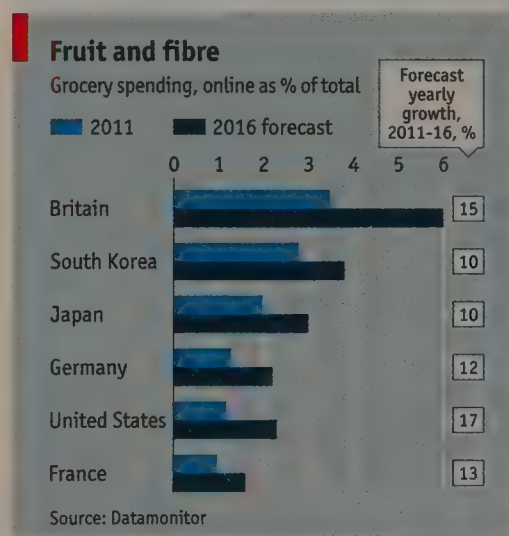
LONDON AND NEW YORK

Grocery has so far resisted the rise of online shopping. That may be about to change

THERE is “a huge difference between being late and being too late,” said Dalton Philips, the boss of Morrisons, on November 21st, as he announced the launch of the British grocer’s online-shopping service. Morrisons’ competitors have been selling broccoli and baby food via the internet for more than a decade. Britain’s fourth-largest grocery chain had shunned e-commerce as a profit-sapping distraction. It paid with falling market share and the defection of some of its best customers to Tesco, the country’s biggest grocer, and Ocado, an online-only supermarket.

Morrisons’ change of heart will be noticed beyond Britain. Grocery is the biggest category in retailing but the most resistant to the advance of online shopping. Even in Britain, where it has gone furthest, it may account for just 5% of sales this year. But it is growing fast everywhere (see chart). The Boston Consulting Group (BCG) expects the global market to grow from \$36 billion this year to \$100 billion by 2018.

Grocers have held back for good reasons. Like many bricks-and-mortar merchants they fret that online commerce will shrivel sales in stores but not the costs associated with them. Grocery, with its tiny profit margins, adds complications. Virtual shopping-carts contain dozens of low-value items, which must be stored at different temperatures. Retailers can either get in-



store staff to pick them off the shelves, which becomes disruptive as volumes rise, or build dedicated warehouses, which is costly. So are home deliveries: even in thickly settled Britain each one costs grocers around £10 (\$16), but shoppers typically pay little more than £3.

Consumers are also wary. Many want to examine fresh produce before they buy it. They recoil when online grocers deliver “substitutions” instead of what they ordered. Many shoppers try grocery websites but “get discouraged”, says David Shukri of the Institute of Grocery Distribution in London.

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Among pioneers there have been spectacular wipeouts. California’s Webvan expanded at breakneck speed, pampered customers with services like home delivery within half-hour slots, lost control of costs and collapsed in 2001. Its demise deterred imitators. In Britain Ocado has yet to make much money after more than a decade. Tesco claims its online operation, with nearly half the British market, is profitable. But it uses “murky” accounting for the cost of stores, where much of the produce is picked, says Andrew Gwynn of Exane BNP Paribas, an investment bank.

Yet to shun online is to risk losing grocers’ best customers, prosperous families and those with children. “It really is a prisoner’s dilemma and you can’t afford not to play,” says Chris Biggs of BCG.

Guess who’s delivering dinner

In America, today’s Webvans look sturdier. Peapod, the biggest American online grocer, acts as the internet arm of the Giant and Stop & Shop chains; all are part of Ahold, a Dutch giant. It has shown a flair for innovation: Peapod’s customers can buy by scanning images of products on delivery lorries and coffee cups with their mobile phones. Lazy Manhattanites have been ordering Thanksgiving feasts from FreshDirect, the second-largest online grocer, which is partly owned by Morrisons. Both ventures prosper because they cater to well-off families, largely in cities.

American behemoths are unlikely to leave the field to specialists. Amazon began fresh-food deliveries in Seattle in 2007 and in Los Angeles last year. It is expected to add maybe 20 cities in 2014, some abroad. Traditional grocery chains will respond. “They are determined not to repeat the mistakes other sorts of retailers made ▶▶

► at the turn of the century, when they were too afraid of Amazon," says Robert Hetu of Gartner, a technology-research firm.

Safeway, the second-largest supermarket chain in North America, is the only one besides Ahold with a substantial online operation. Walmart, the world's biggest retailer, remains hesitant. Neil Ashe, its head of e-commerce, has questioned whether the chain's budget-minded customers want groceries (as opposed to bigger items) delivered. But this may be changing. A pilot project in San Francisco and San Jose is being extended to Denver. Walmart Labs in Silicon Valley has imported many of the people who developed the online-grocery business at Asda, its British subsidiary. On

November 25th Walmart said that its new chief executive would be Doug McMillon, who as head of the international operation is responsible for Asda. He may speed Walmart's halting American effort.

If a big American retailer plunges in, "others will take it seriously" and the market will expand rapidly, says Mr Biggs. With luck, the newcomers will avoid the mistakes of earlier stumblers. Where internet grocery is still immature, supermarkets can encourage shoppers to "click and collect" from stores rather than spoil them with home delivery. A likelier model for sprawling, car-crazy America is France, where shoppers pick up groceries from drive-through supermarkets. As volumes

rise, picking will shift to shopperless "dark stores" and to automated, super-efficient "fulfilment centres" like Ocado's.

BCG reckons that shoppers who become online converts spend 30% more. Another boon is that distribution centres on cheap land consume less capital than urban stores. Online grocers can thus earn a decent return on capital even with thin operating margins, Mr Gwynn says. He expects Ocado, which will share its second fulfilment centre with Morrisons, to achieve its first "proper" profit (before interest and tax) next year. But as more consumers do their bulk buying online, and grocers start shutting their bigger urban stores, there will be a lot of large retail properties looking for new tenants.

Morrisons does not have the luxury of starting slowly. It hopes to make up for its late start by entrancing shoppers. It will post frank ratings of its produce to build trust, a trick learnt from FreshDirect. If a customer doesn't like the look of the fresh food delivered to her door, she can send it back and claim a voucher.

Isn't this the sort of coddling that wrecked Webvan? No, says Mr Philips, for three reasons: Morrisons will exploit its buying power, its emphasis on fresh food brings relatively high margins and it will piggyback on Ocado's operations. The latecomer will beguile shoppers. It may be harder to charm shareholders. ■

Eataly

Let them eat truffles

TURIN

Italian food for the discerning—and loaded

FOR cognoscenti, the height of Italian taste these days is not Prada or Maserati, but a food market called Eataly. Fruit and vegetables are piled artfully in barrows and crates. Cornucopias of pastas and pestos and peperoncini lie on shelves. Groups of little tables tempt shoppers to stop and sample the salamis, or some of the eye-wateringly expensive truffles for which its founder's home town of Alba, in Piedmont, is famous.

Oscar Farinetti set up the first Eataly in 2007, in an old vermouth warehouse in the Lingotto district of Turin. His 21st is due to open on December 2nd in Chicago. When Eataly came to Manhattan in 2010, the media were still reporting queues around the block two weeks later. Perhaps one of Mr Farinetti's American partners—Mario Batali, a well-known New York chef—had something to do with that. But in Tokyo too, after a slow start, people have taken Eataly to their hearts and wallets.

Mr Farinetti is a serial entrepreneur who had the good sense to sell his previous electrical-retailing business before the bottom fell out of it, and switch to a more promising sector. But he is also a fully paid-up member of the Slow Food (as opposed to fast food) movement founded by Carlo Petrini, his friend and fellow Piedmontese. Under Mr Petrini's guidance Eataly stocks the produce of several small firms, such as Gragnano durum-wheat pasta, wines from Piedmont and the Veneto and oil from western Liguria. Information cards tell shoppers who produced what and how. The idea, says Mr Farinetti, is not just selling food but "increasing the percentage of people who eat with awareness, choosing high-quality products and paying

special attention to the source and processing of raw materials."

It works. Turnover this year is likely to be €300m (\$407m), up by 30% from 2012, thanks to the opening of new shops. More are planned by 2017, across America and in London and Paris. Sales have risen in existing stores, too, by 4%-plus in Italy, 5% in New York and 10% in Japan. Earnings before interest, tax, depreciation and amortisation are almost 20% of revenue in New York and 15% in Turin.

Eataly provides its customers with gorgeous surroundings—less combative than at Harrods in London, less oppressively wholesome than at Whole Foods Markets, an American chain—in which they might imagine Gianmaria and Francesca weeding the tomato plants or treading the grapes. Mr Farinetti is selling them a seductive image of Italy itself.



Also flavoured with dollars

American tech companies in China

A question of trust

SAN FRANCISCO AND SHANGHAI

Edward Snowden is not the only cause of American firms' Chinese troubles

WHEN Hewlett-Packard reported quarterly results on November 26th, Meg Whitman, the chief executive, noted that the performance of many of its businesses in China had weakened. HP thus joined a growing list of American technology companies which have given recent warnings of harder times for their Chinese operations. Some commentators—and the odd executive—have mused that Edward Snowden may have something to answer for. His revelations about America's technological spying, it is thought, are leading Chinese customers to shun American gear.

Fears of a backlash had been reinforced on November 25th when Qualcomm, an American semiconductor designer, said it was under investigation by an agency responsible for enforcing China's anti-monopoly law. Qualcomm says that it is not aware of doing anything that might break the law and that it is co-operating with the agency. Paul Jacobs, its boss, told the Wall

► *Street Journal* that “all US tech companies are seeing pressure in China” right now.

Many are, but the reasons for this are more numerous and complex than Chinese suspicion of American snooping. Take IBM. Its revenue from China plummeted by 22% in its latest quarter, compared with the same period of 2012. Big Blue admitted that internal “execution problems” were partly to blame. Less convincingly, it also cited a delay in the completion of China’s latest economic plan and hence the tech spending associated with it.

Cisco is also feeling a chill. In its latest quarter the Chinese revenues of the American maker of computer-networking equipment were 18% lower than a year before. Cisco also forecast that its worldwide sales would fall by up to 10% in the current quarter, partly because of weakness in China. Asked on an earnings conference call whether the Snowden affair was hurting business, Cisco executives said it was causing some Chinese customers to pause before making purchases.

But Cisco’s share of sales of routers and switches to internet-service providers such as China Telecom and China Unicom, and to other providers of web-based communications and internet-connectivity services, had been falling well before the spying imbroglio (see chart). David Krozier of Ovum, a research firm, says Cisco left itself vulnerable in China by failing to respond quickly enough to advances by rivals such as Alcatel-Lucent, of France, and Huawei, a Chinese company. Another American supplier, Juniper Networks, has managed to increase its share.

As for the Qualcomm investigation, it is tempting to see this as a further consequence of Mr Snowden’s mischief. But Qualcomm is not the only foreign company under the microscope. Recently others, including Danone, a French food firm, and Starbucks, an American coffee-shop chain, have been scrutinised for allegedly fixing prices or charging too much.

The Chinese government could instead be trying to send an unsubtle signal to Qualcomm. The company dominates the

market for chips that let mobile devices use super-fast, 4G mobile networks, which Chinese telecoms firms are rolling out. The sudden scrutiny may thus be intended to ensure that Qualcomm asks only modest royalties of Chinese handset-makers.

All of this suggests the cost of Mr Snowden’s revelations has been modest. American firms are having difficulties in China partly because of their own missteps, but also because Chinese firms such as Huawei and ZTE have grown into powerful competitors. The American government

has, however, made matters worse by seeking to deter firms in the United States from using Chinese telecoms-networking technology, on the ground that it could threaten national security. That is fuelling what Ed Maguire of CLSA, an investment bank, calls “tech mercantilism”. China had policies favouring local suppliers of tech equipment many months before Mr Snowden’s leaks. A tit-for-tat trade battle will do far more damage to American tech firms’ fortunes in China than reports of the shenanigans of their country’s spooks. ■

Cinema economics

Bigger on the inside

NEW YORK

Now showing at your local cinema: operas, circuses and television shows

“W”HOVIANS” habitually sit on the sofa—or hide behind it—to watch their favourite time-traveller battle Daleks, Cybermen, Zygons and other monsters. But on November 23rd thousands of them, all around the world, settled into cinema seats to see “Doctor Who” in 3D. The 50th-anniversary episode of the British television show was screened on 800 big screens in 20 countries at the same time as being broadcast on the BBC’s channels.

The Doctor’s appearance exemplifies the rise of “event cinema”, in which film theatres show more than just films. Cinema-goers can be thrilled by live sporting events or lulled by arias from the world’s great opera houses. They have still been able to see “Life and Death in Pompeii and Herculaneum”, although the exhibition at the British Museum closed in September. Event cinema accounts for only around 1% of global box-office takings, but it is growing quickly. David Hancock of IHS, a research firm, thinks it will bring in \$380m this year and maybe \$1 billion by 2018.

This new breed of programming is made possible by the spread of digital technology. Cinemas no longer rely on the delivery of 35mm reels, now that pictures can be delivered over satellite or broadband connections. Cinema-owners can make fuller use of their screens, and audiences see delights they would otherwise miss. “We have a presence in 78 Mexican cities,” says Alejandro Ramirez, the boss of Cinépolis, which runs plush cinemas in the Americas and India. “In the vast majority of these cities, there is no opera,” he notes. So far this year nearly 300,000 people worldwide have gone to see opera and other “alternative programming”, such as “Cirque du Soleil 3D”, a circus performance, at Cinépolis’s theatres.

Cinema-owners want to do more than



Who’s in the cinema

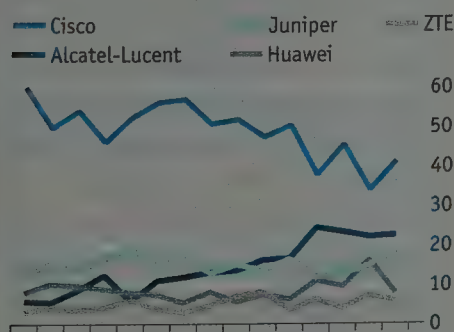
beam in events. For instance, Tim Richards, the founder of Vue Cinemas, which operates chains in Europe and Taiwan, predicts that theatres will be rented during off-peak hours to video-game players to display contests on the big screen. “We are not trying to displace Hollywood films,” he says. “All we are trying to do is make better use of the assets we have.”

Finding new uses for screens is a product of economic necessity as well as technological opportunity. Ten years ago Americans and Canadians went to the cinema almost five times a year on average; now it is closer to four. In America and Europe in particular, at-home film offerings, including video-on-demand, are plentiful—and cheaper than a night out.

To make that night out worthwhile, cinemas, like ageing starlets, are trying to doll themselves up. They are installing plusher ►►

Missed connection

Sales of routers and switches to firms in China providing web-based communications and internet-connectivity services, % share



Source: ACG Research

►chairs, many of which recline nearly horizontally. AMC, an American chain, has found that these “VIP” seats decrease theatres’ capacity by two-thirds, but can boost attendances by 90% or more, as well as commanding higher prices.

Cinemas have rarely lived by the price of admission alone—margins on popcorn are around 80%—and many are trying to fatten what they can earn once people are inside the doors. More cinemas are selling booze, notably in countries where a night at the pictures has usually been a dry affair. In 2011 Matthew Viragh, the founder of Nitehawk Cinema, an independent theatre in Brooklyn, campaigned successfully to overturn a New York state law banning the sale of alcohol in cinemas. Moviegoers are much likelier to order a second drink than a second tub of popcorn.

Some offer full meals, served by waiters, so that audiences can eat while they watch. Nitehawk even provides dishes suited to the films on show. One recent evening a viewing of “Kill Your Darlings”, a new film about Allen Ginsberg, could be accompanied by a Beet Generation salad (yes, beetroot) or an Allen in Wonderland cocktail. Concocting a mouthwatering menu for Whovians may be harder: a Zygon, in the Doctor’s words, is “a big red rubbery thing covered in suckers”, with venom sacs in its tongue. *Bon appétit.* ■

Broadcasting in Australia

The news on Nine

A network’s IPO shows investors are nervous about broadcasters’ prospects

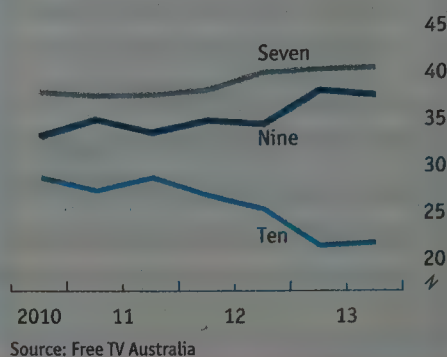
DAVID GYNGELL’S first child was born the night after he helped to arrange a recapitalisation of Nine Entertainment. The deal saved Australia’s second most popular free-to-air television network from administration. A year on, Nine’s chief executive is about to see his corporate baby toddle onto the stock exchange. Nine is due to re-list on December 6th with an expected market capitalisation of about A\$2 billion (\$1.8 billion).

Nine’s controlling shareholders, Oaktree Capital Management and Apollo Global Management, two American hedge funds, will reduce their combined stakes from 53% to 36%. They are taking advantage of a rising equity market, of Nine’s rising ratings and of its growing share of the metropolitan free-to-air advertising market.

The share issue, however, is not being underwritten by its joint lead managers—two global banks, UBS and Morgan Stanley, and two local ones, Commonwealth and Macquarie. This suggests that some in-

One, two, three

Australian free-to-air TV advertising market
Shares by channel, %



vestors may be wary about backing a free-to-air broadcaster when digital advertising is growing apace and the government is rolling out a national broadband network. The free float will be limited to one-third of the new shares.

Nine has endured as much drama as an episode of “Hostages” (a show it imports from America). Late last year the broadcaster was facing bankruptcy until a proposal by Oaktree and Apollo to convert its more than A\$3 billion of debt into equity was finally accepted by other lenders.

The hedge funds then took control of Nine from CVC, a private-equity group which had bought the company for A\$5.6 billion in stages between 2006 and 2008, at the height of the bull market. CVC had in turn purchased Nine from James Packer, whose father, Kerry, controlled the network until his death in 2005. James Packer wanted to redeploy the family’s wealth from media into casinos.

Earlier this year Nine bought stations in Adelaide and Perth from WIN, another broadcaster. With these (already called “Channel 9” in both cities) and its existing operations in Brisbane, Melbourne and Sydney, Nine has a national metropolitan network for the first time. Nine’s share of the metropolitan broadcast-advertising market has risen to within three percentage points of that of Seven Network, the leader, if Nine’s newly acquired stations are included (see chart). Third-placed Ten, chaired by Lachlan Murdoch (son of Rupert), has been struggling. By investing in Adelaide and Perth, Nine hopes to push up its ratings and advertising revenues by even more.

However, Nine remains exposed to the ad cycle. Four-fifths of the group’s revenue comes from television. Digital media and events businesses bring in the rest. Moreover, online advertising is expected to overtake free-to-air TV as the leading ad category in Australia this year.

For Mr Gyngell, Nine is a family affair. His wife is a presenter and his late father, Bruce, was an executive there under Kerry Packer. Mr Gyngell may have ensured its survival for another generation. ■

23andMe

And the FDA

NEW YORK

A regulator brings a genetics company to a halt

THE Food and Drug Administration had been kept waiting long enough. On November 22nd the FDA, America’s public-health regulator, sent a stern letter to 23andMe, a genetic-testing firm. Despite “more than 14 face-to-face and teleconference meetings, hundreds of e-mail exchanges and dozens of written communications”, the FDA complained, the company had not met its requests for data—nor even contacted it since May. The FDA ordered 23andMe to stop selling its testing service forthwith. The company has 15 days to respond to the regulator’s concerns. Fights over genetic testing, however, are sure to go on for a lot longer.

It used to be that patients learned about their health only from their doctor. Thanks to mobile health gadgets, apps and services such as 23andMe’s, that is changing. Since 2007, 23andMe has invited its customers to spit into a tube, send it back to the company and thus learn the secrets of their genome—or, at least, the aspects of it that 23andMe tests. The company is a Silicon Valley favourite, led by Ann Wojcicki, wife of Sergey Brin, one of Google’s founders. Its backers include Google and Yuri Milner, a billionaire investor in Facebook and Twitter.

Ms Wojcicki maintains that people have a right to their genetic information. The FDA is more cautious. It says that telling people about their genome is all well and good, but because 23andMe’s tests might be used to make medical decisions, the agency must verify their accuracy. In its letter to the company, the FDA said that inaccurate information about a gene linked to breast cancer could lead a woman to have unnecessary surgery.

The company applied for FDA approval last year. Regulators asked for more information, but the agency says 23andMe did little to gather it. Meanwhile, the company pressed on with other plans. In the past year the firm has lowered the price of its tests to \$99 and hired Andy Page, a former president of Gilt Groupe, a shopping website, as its own president. With the goal of testing 1m people, 23andMe launched a national television campaign in August. But seeing little sign of progress with its application, the FDA has called a halt.

It is unclear how the dispute between the FDA and 23andMe will be resolved. In a blog post on November 26th Ms Wojcicki defended the quality of her company’s products but admitted that it was “behind ►►

Source: DWTC, 2012-figures latest available

1.65

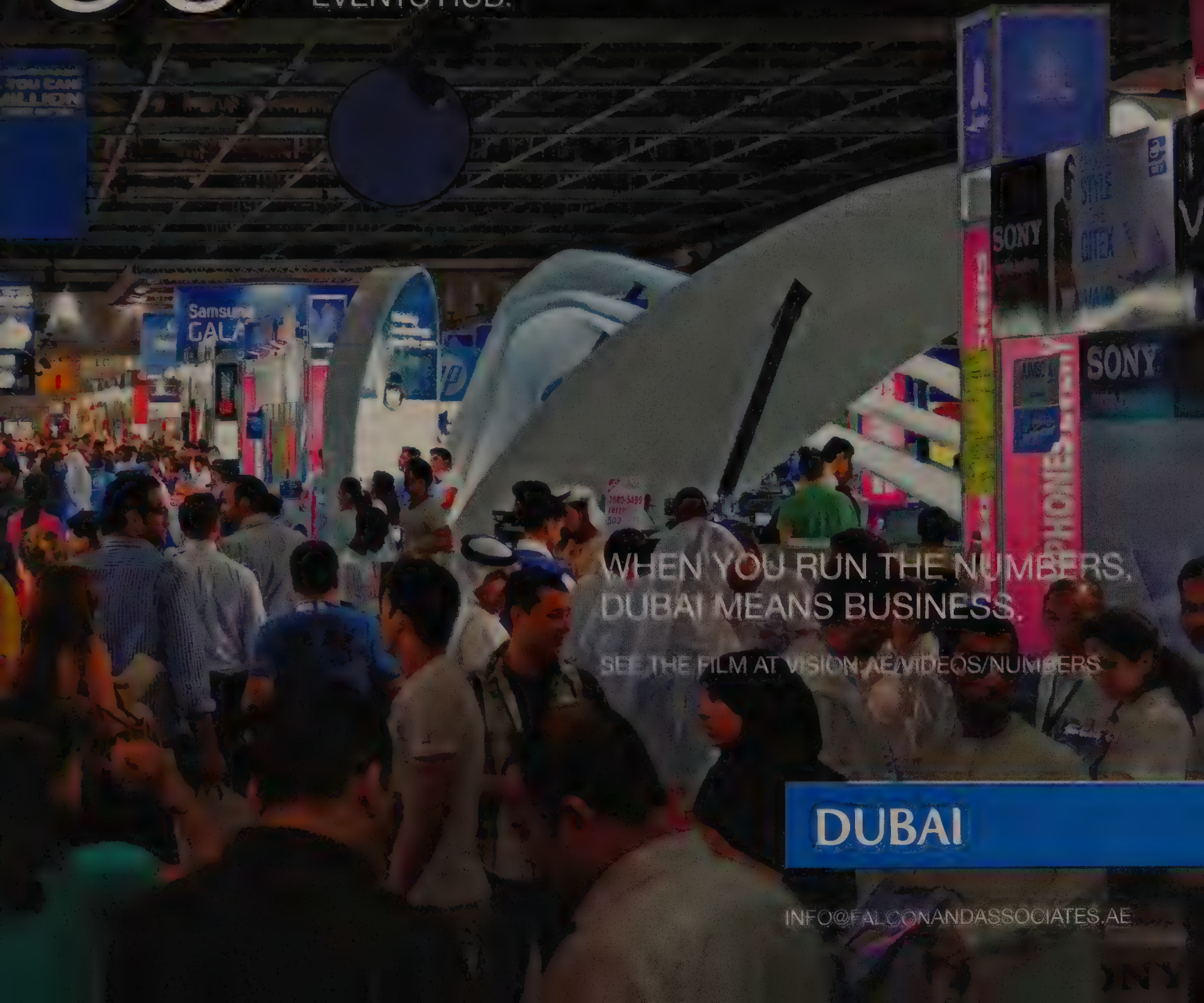
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► schedule" in its response to the FDA. More rules on gene tests of all sorts are on the way. The cost of sequencing a person's entire genome has fallen to less than \$5,000, from \$95m in 2001, according to the National Institutes of Health, America's medical-research agency. The FDA says it is trying to push things along: on November 19th it approved the first "next-generation" sequencer, made by Illumina, a company

from San Diego. Doctors will be able to search patients' whole genomes to help guide treatment.

Though the FDA talks up progress, there is a risk that it may slow it down. The agency is weighing regulations on test kits sold directly to consumers, laboratory tests and software that analyses raw genetic data. It is clear that 23andMe is not the only testing firm in its sights. ■



The paper industry and climate change

Roll on the green revolution

A technological fix is proposed to combat global warming

TECHNOLOGY and greenery don't mix well. Some greens are technophobes. Most environmental policies focus on prices, consumption and subsidies to solar and wind power, which are not at the cutting edge. The list of technological breakthroughs is short. One of the most promising is carbon capture and storage, which neutralises emissions of carbon dioxide from burning fossil fuels. A big project was being built at Mongstad in Norway—but the Norwegian government has just pulled the plug on it.

All the more reason, then, to look with interest—and a measure of scepticism—at an effort by European pulp and paper companies to slash their emissions through technological change. This week they announced some ideas which, if adopted by the whole industry, would cut its energy use by at least a quarter and its output of CO₂ by more than half by 2050. The ideas will test how far technology developed by companies can reduce global warming.

Pulp and paper is a big energy consumer—the world's fifth-largest industrial user. The World Resources Institute, a think-tank, put the industry's CO₂ emissions at about 500m tonnes worldwide in 2005. However, European companies are relatively green: the Confederation of European Paper Industries (CEPI), a trade association, says its members' emissions were 46m tonnes in 2011. Pulp mills in under-regulated places also produce disgusting gunk. A mill on the pristine shores of Lake Baikal, in Russia, has been dumping bleach into the world's biggest body of (once) freshwater for many years.

Facing demands for deep cuts in CO₂ emissions, CEPI decided to see if technological change could yield more than just marginal improvements. It set up two teams of scientists and businesspeople, each under a former chief executive (of Smurfit Kappa, the fourth-largest European papermaker, and Mondi, the fifth). The teams set up a common knowledge

base because the idea was to test creativity, not proprietary information. They also sought ideas from outsiders with carbon-reduction programmes, such as Tata Steel. Each team came up with four ideas. On November 27th a jury chose a winner.

To make paper, you either grind wood-chips mechanically to separate the fibres, or cook them with chemicals to remove the lignin, which binds the fibres together. You then dissolve the fibres in vast quantities of water and push them through a slit into a machine that squeezes out the water and dries the sheets.

The winning proposal would do away with all this grinding and chemical cooking. Instead, it would use things called deep eutectic solvents to dissolve wood and separate out the lignin. These solvents occur naturally: plants produce them during droughts. They would essentially turn papermaking into a biochemical business, cutting primary energy use by 40%. They would also generate useful by-products, such as pure lignin, a raw material for bulk chemicals, and a form of cellulose used in high-value chemicals. One of the requirements of the project was that the ideas should add value, not just cut cost.

Most of the energy now used in making paper goes on drying the sheets. So making it without water would also cut energy consumption. The teams came up with two ways of doing that. One would separate the fibres with steam (using less water). The other would suspend the fibres in a viscous fluid and then expel the fluid by modifying the viscosity around the fibres. This idea has been pinched from penguins. To escape from seals underwater, the birds release trapped air bubbles which form a thin layer of air around their plumage, reducing friction.

At the moment these ideas exist as pilot projects or in the laboratory, but not commercially. The most important test of their usefulness is therefore yet to be passed.

Even so, several lessons have emerged. The main one is that there are technological solutions to climate change. "We were amazed at what we found," says CEPI's Marco Mensink. Some of the ideas not only cut emissions but take energy-intensive firms into new areas—biochemicals, in the case of pulp and paper. Next, companies can do a lot about climate change themselves. They do not need to wait for a nudge from governments, although CEPI also wants the European Union to put some money where its mouth is and support more basic research.

Last, the project was unusual in that companies collaborated over technology. Normally they compete. The pulp and paper firms managed to work together by confining their efforts to "generic pre-competitive concepts"—ie, basic breakthroughs. The hope is that they will now compete to implement them. ■

Schumpeter | Going off the rails

Companies need to keep an eye on their bosses for signs of destructive behaviour



THOSE of us who still read newspapers over breakfast have had a delicious choice of late: do we start with the story about Bradford's crystal Methodist or the one about Toronto's stupor-man? Paul Flowers, the former chairman of Britain's Co-operative Bank and a Methodist minister, allegedly bought cocaine and crystal meth for a "drug-fuelled" orgy. Rob Ford, Toronto's mayor, has finally admitted, after months of denials, that he smoked crack cocaine—before adding the comforting proviso that he only did it in "one of my drunken stupors".

What does any of this have to do with Schumpeter's home territory of chief executives? Mr Flowers was no banker: he rose through the co-operative movement's political structures. Mr Ford is an elected politician. But they nevertheless illustrate a problem too often ignored in business, where people are much happier talking about dollars than dolour: how can you tell when a boss is showing signs that he may go off the rails? And what should be done about it?

The corner office is almost a factory for personal problems. Chief executives are under greater pressure to perform at the best of times; how much greater in periods of economic turbulence. Yet at the same time power corrupts. In experiments social scientists have shown, by giving random subjects power over others, that even in small doses it produces overconfidence, insensitivity and an urge to associate with other people with power.

Chief executives' oddities can lead to complete corporate breakdown: it is impossible to read about the implosions at WorldCom or Hollinger or the Royal Bank of Scotland (RBS) without being astonished by the bosses' behaviour. But even in less dysfunctional firms the whims of the man at the top can cause damaging depression or sycophancy below. Chief executives are the nearest things democracies have to sun kings.

An obvious sign of a boss breaking bad is grandiosity. He attributes the company's success wholly to himself, indulges in endless self-promotion or demands ever more extravagant rewards. Jean-Marie Messier, who transformed Vivendi from a staid water utility into a media conglomerate that ran up huge losses, borrowed his nickname—"J6M", which stands for "Jean-Marie Messier Moi-Même-Maître-du-Monde"—for the title of his autobiography. One study shows that chief executives who appear on the

covers of business magazines are more likely to make foolish acquisitions. A second sign is over-control. The boss surrounds himself with yes-men and crushes dissent. He tries to control every detail of corporate life rather than building a strong executive team. A third sign is distorted decision-making. The chief conflates personal and corporate assets, is obsessed with buying other companies, or focuses on bizarre details. Mr Messier spent \$17.5m of Vivendi's money on a New York apartment for his personal use. Fred Goodwin, boss of RBS, micromanaged the building of a £350m (\$630m) head office, called "Fredtown" by his underlings, and found time to redesign the bank's Christmas cards.

A chief executive becomes likelier to succumb to these vanities the longer he stays in the job. He gets used to people fawning over him. He measures himself against other inhabitants of Planet Davos, not those Barack Obama calls "regular folk". Percy Barnevik, the boss of Asea Brown Boveri, an engineering conglomerate, was widely hailed as "Europe's answer to Jack Welch". But the comparison went to his head: he pursued ever more reckless acquisitions and got himself awarded a tax-free pension of \$87m. A boss may think himself so brilliant he refuses to plan for his eventual departure or undermines possible successors. Armand Hammer, of Occidental Petroleum, asked his board to agree to a long-term bonus plan, with a ten-year payout, when in his 90s.

What can companies do to stop the boss behaving oddly—ideally, before he starts? In a recent study MWM Consulting, a firm of headhunters, argues that boards need to make "behavioural risk" a standard part of their agenda. This might well include taking soundings from senior management. Chairmen also need to start talking to chief executives about the personal side of the job when they are first appointed, and keep talking afterwards.

Remember the Little Bighorn

However, the best answer lies with chief executives themselves, who must recognise that the biggest threat to their success may lie within. They need to cultivate the art of seeing themselves as others see them. Kevin Sharer, the former boss of Amgen, a biotech company, used to get his direct reports to list his strengths and weaknesses annually for the board. He also kept a painting of General Custer in his office as a warning against hubris.

The business world is starting to take these problems seriously. One of the most popular courses at Harvard Business School is Clayton Christensen's course on how businesspeople should guard against an obsession with short-term success. About 40% of the heads of FTSE 100 companies employ "personal coaches". Chief executives last half as long in the job, on average, as they did a decade ago. That may be bad for their nerves, but it makes them less likely to be become marinated in power.

That said, it is foolish to treat a cold as a cancer. Bosses have a right to privacy. In recent years Boeing and Hewlett-Packard have erred in disposing of chief executives after consensual affairs. The border between eccentricity and brilliance can be blurred. Bosses are peculiar anyway: more ambitious and more self-confident than the rest of us. Some of the most creative people in business have been very peculiar indeed: Henry Ford loved conspiracy theories of the blackest hue; Thomas Watson of IBM commissioned company songs in his own honour. The most important business decisions are still, as they have always been, nuanced ones about character and its complexities. ■

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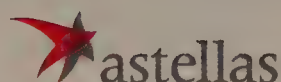
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Financial-sector reform in India

Bridging the gulf

MUMBAI

A financial system intended to promote equality and stability no longer does

SINCE taking office in September Raghuram Rajan, the governor of India's central bank, has championed financial-sector liberalisation as a way to boost growth and help the poor. Change is risky, he has said. "But as India develops, not changing is even riskier."

India's financial system is like a ramshackle engine lovingly maintained by a sect of oil-spattered engineers and wearily tolerated by most people who depend on it. After Indira Gandhi, then prime minister, nationalised most banks in 1969, India slipped towards financial socialism, with a central bank that printed rupees on politicians' command. When India opened up in 1991 a wave of reform took place. The system today is a mishmash. Market forces have a role, but the state looms large.

There are several well-run private banks, such as HDFC. But public-sector banks (most of which are listed but under state control) make three-quarters of all loans. Foreign banks' market share is 5%. Unlicensed moneylenders thrive, hinting at lots of unmet demand for credit.

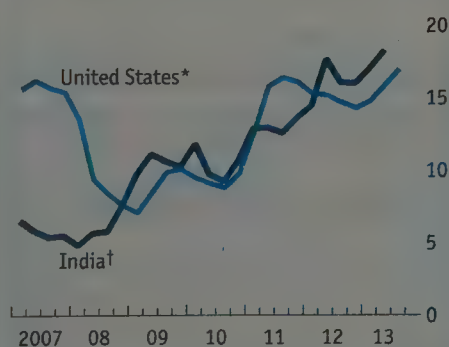
The Reserve Bank of India (RBI) is now fairly independent and no longer sets the rates of interest banks charge, but it still manipulates the flow of credit to assist the government and, at least notionally, the poor. Banks must invest 23% of their deposits in government bonds, and park a fur-

ther 4% with the RBI. This creates a captive market for public debt, the bulk of which is owned by banks. Some 40% of loans must be directed towards "priority sectors", mainly agriculture. Taken together these rules mean that 58% of the deposits the banking system raises are deployed according to the government's preference.

A plethora of restrictions means the corporate-bond market is tiny. This helps the government since it means that its bonds are the only game in town for fixed-income investors. Whereas the stockmarket is very open, capital controls govern the flow of foreign funds into the debt market

Lenders of first resort

Government securities
Central banks' holdings, % of total



Sources: Thomson Reuters; *Treasury †Government of Reserve Bank of India India dated securities

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and limit the use of currency derivatives. The RBI intervenes in the market to manage government-bond yields. This helps the state to borrow cheaply.

This hybrid system is not an accident of history. Many officials feel that finance is too important to be left to either free markets or politicians. After all, India's bubble-wrapped system was unscathed by the Asian crisis in 1997-98 and the global crisis in 2007-09. The RBI is one of India's best institutions—uncorrupt and capable.

But for all the good intentions the truth is that this hybrid system may now promote social inequality and financial instability—the twin evils it is meant to eradicate. For a start, after decades of state direction only 35% of adults have bank accounts. This perpetuates poverty and makes it hard to collect taxes.

Bad debts have become a problem, too. About 11% of state banks' loans have soured. The reserves they hold are low and their capital levels are mediocre. Because of India's weak legal system, banks dislike forcing firms into bankruptcy. Part of the problem is temporary, reflecting the economic slowdown and bottlenecks in infrastructure projects. But state banks have been pressed to roll over credit lines to troubled but well-connected big firms that most private banks steer clear of. This sort of cronyism makes the banking system less stable. It is also unfair: the public is subsidising inept tycoons.

Nanny finance has not created a national champion. India's biggest lender by market capitalisation, HDFC, is ranked 63rd globally. No local bank yet has the international savvy of its Chinese, Brazilian and Russian counterparts. All those rules have pushed activity offshore. At least half of all rupee trading is abroad. Citigroup ►

▶ and Standard Chartered, which along with HSBC are the biggest foreign banks in India, have an overall exposure to the country (including loans, trading positions and derivatives) that is 1.9 times the size of their regulated Indian operations.

The hybrid system is complicit in a borrowing binge by the government: the budget deficit is running at 7.8% of GDP. Since bond yields are held down artificially by the RBI, which buys bonds itself and forces banks to, politicians can borrow heavily without fear of a buyers' strike.

Low interest rates and fast-rising prices mean the return savers get on deposits is

below consumer-price inflation (CPI). Some people buy shares instead, but many bypass the formal financial system and buy gold, straining the balance of payments. Over half of the current-account deficit of 4.8% of GDP in the year to March 2013 was due to bullion imports. The vicious cycle of borrowing, inflation and gold partly explains the 22% slump in the rupee between May and August. It has since recovered a third of its losses, partly thanks to Mr Rajan's soothing presence.

Mr Rajan's liberalising vision was outlined in an official report that he wrote in 2008, when he was an academic. It was po-

lently ignored at the time by an establishment that was enjoying a moment of *Schadenfreude* as Western countries which had hectored India saw their banks implode. Now he is in charge at the RBI he wants to create a blast of competition that will spread finance to more Indians. The RBI will give licences to new banks, probably early next year, and allow foreign banks to expand faster as long as they create local subsidiaries that can be regulated easily. The rules that force banks to buy government debt will be relaxed "in a calibrated way". Mr Rajan says he will stop tycoons from exploiting the system and force banks ▶▶

Buttonwood | Cap and trade

A modern proposal with ancient roots

HOW much interest should a borrower be made to pay? It is a debate that goes back thousands of years. Hammurabi, a ruler of ancient Babylon, set an annual limit of 33.5%. Brutus, Julius Caesar's assassin, was rebuked for charging a rate of 48% when the legal limit was 12%. Aristotle argued that since coins do not "bear fruit", unlike cattle, which might bear calves while on loan to a neighbour, no interest should be paid at all when borrowing money.

The issue has returned to the headlines again as George Osborne, Britain's finance minister, announced plans to instruct the Financial Conduct Authority, which regulates consumer finance, to cap the cost of so-called "payday loans". These loans, often taken out by poor people whose fraying finances leave them short of cash at the end of the month, can carry annual rates of several thousand percent.

In medieval times this would have been forbidden as usury—the charging of excessive rates of interest. The definition of "excessive" varied, although it is safe to say that payday loans would have qualified. Some American states still maintain caps on interest rates for certain types of lenders.

Catholic writers such as Hilaire Belloc distinguished between productive and unproductive loans. Charging interest on a loan to a sick friend who has lost his job is wrong, he argued; charging interest on a loan to a businessman opening a factory is fair enough. The imposition of interest on an unproductive loan is an attempt to "gather harvest from a barren land".

The sense that creditors are exploiting borrowers was quite common in history, with Shakespeare immortalising the idea in Shylock's demand for a "pound of flesh". The sympathies of Charles Dick-

ens were also with the borrowers: the pitiful Mr Dorrit languishing in the Marshalsea prison or the charming Mr Micawber keeping one step ahead of his creditors.

But the mere fact that Mr Dorrit was behind bars indicates that official attitudes to debt had hardened by the 19th century. The insolvent debtor was a deadbeat who had failed to keep his side of the bargain; going into debt was a moral failing.

Modern sympathies lie much more with the borrower, as is perhaps inevitable after decades in which consumer credit has boomed. Most people are in debt at some stage of their lives; indeed the life-cycle theory of consumption states that it is virtually inevitable. If you can borrow when you are young and can look forward to a rising future income, you can smooth your spending over your lifetime.

Governments may be lectured about being spendthrift, at least by right-wing politicians. But businesses and consumers are positively encouraged to borrow. Indeed, when debt growth slows, as it has in recent years, an air of panic develops about how to get it going again. Oddly enough, given the prevailing climate, the

policy of quantitative easing, as pursued by central banks, has made it easier and cheaper for governments to fund their deficits without doing a lot to stimulate business and consumer lending. The difficulty in obtaining credit from conventional banks has probably helped spur the growth of payday lending—along with the squeeze in real incomes that has resulted from high unemployment and sluggish wage growth.

So if payday lending is filling a need, why intervene in the market? Provided the terms of the loan are made clear, then it should be up to borrowers to decide whether to accept the costs involved. An interest rate is simply the price of money. And Mr Osborne himself said in September, with reference to an energy-price freeze proposed by the opposition Labour Party, that "attempts to fix prices and confiscate wealth crush endeavour and blunt aspiration."

The standard argument against interest-rate caps is that they restrict access to capital and drive borrowers into the arms of illegal, backstreet lenders, whose collection methods may be rather unsavoury. But the standard arguments don't wash in political terms—there is something almost visceral about our dislike of high rates. They smack of exploitation of the vulnerable, of kicking a man when he is down.

Given the debt burden that still weighs down Western economies, there are few votes to be gained by a policy of maintaining the rights of creditors. Debt needs to be reduced by default, inflation or financial repression (keeping interest rates as low as possible). It is hard to shed any tears for the payday lenders, but they will not be the last group to be targeted.



to recognise bad debts. His unspoken hope is probably that state banks will be fully privatised and forced to raise their game.

All this is easier said than done. Letting private shareholders own a majority of state banks would require an act of parliament. India's politicians like the power they have over these lenders. Palaniappan Chidambaram, the finance minister, has been urging them to lend more to revive the economy. The public-sector banks are unionised and resistant to change.

Private banks, meanwhile, are not charities. Some struggle to gather enough deposits, limiting their growth. A huge expansion in the number of branches would help, but might not be profitable. These institutions prefer to lend to yuppies than to farmers and infrastructure projects. If the RBI gave new licences to industrial houses such as Reliance Group, they might use their powerful brands to attract a surge of deposits. But that would further concentrate power in the hands of a few, and lead to accusations of cronyism.

Nor are foreign banks saints. HSBC and Standard Chartered make 70-90% of their Indian profits from investment and corporate banking. Citi and HSBC, along with Barclays, have already burned their fingers in a push to lend to individuals. In 2006-10 they led a frenzy in unsecured consumer loans and collectively lost \$3 billion. Too-big-to-fail foreign banks might be keen to take over lenders in India. But their jumpy regulators in the West might object.

Mr Rajan is trying to reform at a low-point in the economic cycle. That creates its own problems. Would he really be prepared to trigger a wave of defaults in order to clean up India's bad debts? It seems unlikely. If he raised interest rates above CPI, savers would applaud but growth would fall further. And just months after a financial panic and a dangerous spike in yields, it will be near impossible for the RBI to deregulate the bond market. In mid-November he said the RBI would again intervene to prevent "liquidity tightness". The central bank now owns at least 17% of all central government bonds, the highest level since the crisis years of the early 1990s. It now owns more of its local bond market than the Federal Reserve after years of quantitative easing (see chart on prior page).

For a quick jolt to the system, Mr Rajan's best hope is to embrace low-cost mobile-banking. India has lagged Africa in embracing this technology. But to reform the bond market and traditional banking he will first have to change the RBI. Today it is the honourable guardian of the status quo. Tomorrow it could be a force for reform that takes risks and persuades politicians that a nimbler financial system will make India richer and more stable. Confronting vested interests and ingrained thinking will be a slog but the rewards could be immense. ■

Rice farming in Japan

Political staple

TOKYO

The government abolishes previously sacrosanct agricultural subsidies

NOT even the most ardent reformers around Shinzo Abe, Japan's prime minister, believed that he would dare to scrap the policy, known as *gentan*, under which the government has paid farmers to reduce rice crops since 1971. But on November 26th the agriculture ministry said the system would be phased out by 2018. Rice growers, said Mr Abe, will be able to produce crops "based on their own management decisions".

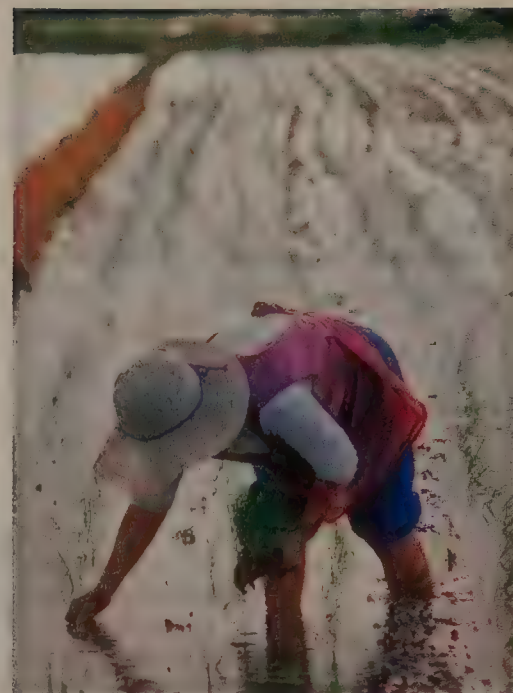
Allowing a free market for rice, the country's sacred staple food, will not by itself transform Japan's inefficient agricultural sector, which has declined precipitously in recent years. But it is an unavoidable and welcome first step. The *gentan* system was originally designed to shield the country's cosseted farmers from short-term fluctuations in prices. By 2010 the policy kept roughly a third of Japan's paddy fields out of rice production, costing vast sums each year in compensation to farmers for lost income.

The country's millions of small rice-growers have thrived on the handout for decades, along with Japan Agriculture (JA), a giant network of local farm co-operatives. Many landowners pocket the government's money while growing nothing at all. About two-fifths of the land taken out of rice production is left entirely idle. Unused land prompts regular public hand-wringing about the abandonment of the life-giving soil to weeds and rubbish.

Japanese agriculture's biggest problem is that all but 2% of farms are smaller than five hectares and many comprise just a few fields, a fragmentation preserved by the *gentan* system and by other regulations. Tiny, often part-time farmers, with few economies of scale, antiquated methods and old equipment hobble the industry. The sticky rice favoured by Japanese consumers ends up costing twice or more what rice does in other countries.

To protect its wildly uncompetitive farmers, Japan has erected one of the world's highest tariffs: the duty on imported polished rice is 777.7%. Mr Abe's surprise decision in March to bring Japan into talks on the Trans-Pacific Partnership (TPP), a free-trade grouping, has brought these duties under pressure. Even though a final deal on TPP is far from certain, the talks are still a powerful force for change.

The phasing out of *gentan* should spur rice production, allowing prices to fall at last. That in turn should encourage small



Padded with subsidies

landowners to hand over their paddies to be farmed by larger operators, says Takeshi Niinami, the government's chief adviser on the reform. Another of Mr Abe's plans is to create new agencies in each prefecture to gather farmland from smallholders, consolidate it and lease it in larger chunks to companies. The combination of the two new policies could halve the cost of growing rice from an average of ¥16,000 (\$16) a 60kg sack to just ¥8,000, says Mr Niinami. At those levels, Japanese rice could hold its own against imports, and even make inroads in export markets.

The scrapping of *gentan* comes just as Mr Abe's commitment to structural reforms appeared to be wavering. This month another adviser, Hiroshi Mikitani, the boss of Rakuten, an internet firm, threatened to resign after the government backtracked on a promise to deregulate the sale of drugs online. Mr Abe is also being criticised for reversing what was perhaps the most lasting reform of Junichiro Koizumi, prime minister between 2001 and 2006, which was to lift restrictions on taxi fleets. A new law passed last week will force taxi firms to reduce the size of their pools in order to keep fares high and drivers well-paid—the reverse of what Mr Abe is trying to do with rice farmers.

The reforms to rice farming may have some flaws, says Robert Feldman, chief economist with Morgan Stanley in Tokyo. The old system, he points out, will continue to apply to terraced rice paddies in mountainous regions. How will mountainous be defined, he asks? Yet tackling *gentan* in any form had been considered far too risky politically for Mr Abe's Liberal Democratic Party, which draws much of its support from farmers and from JA. His willingness to face down such powerful interests is stoking hopes of decisive reform in other fields too. ■

Slovenia's financial crisis

Stressed out

LJUBLJANA

The fight to avoid a sixth euro-zone bail-out reaches a climax

THE government of Slovenia, insists Alenka Bratusek, the prime minister of eight months, can set its country's finances to rights without having to seek a bail-out from the euro zone and the IMF. Having seen the harsh conditions imposed on the previous supplicants, she is determined that Slovenia should chart its own course and says that her government can carry out all the necessary reforms on its own.

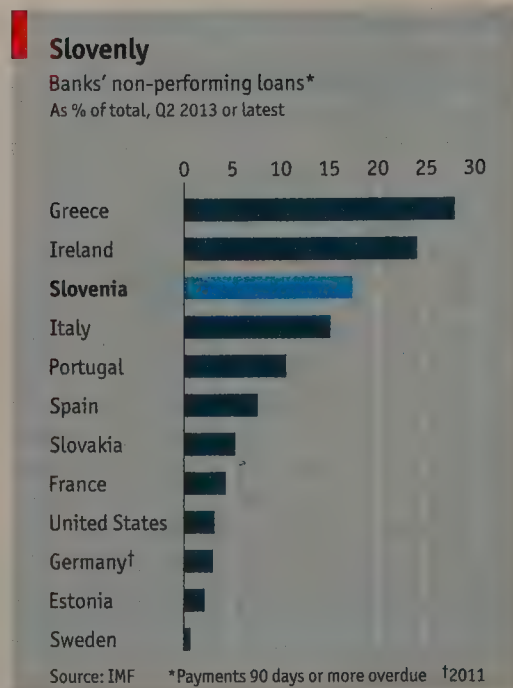
Whether she is right will soon be revealed. In early December an independent audit and stress tests of the country's troubled banks will disclose just how short of capital they are. Unlike Cyprus, which this spring became the fifth euro-zone state to require a rescue, Slovenia has a relatively small banking industry, with assets worth around 130% of GDP compared with the Cypriot banks' 800%. But this offers scant comfort since the three biggest Slovenian banks are bust, able to keep operating only because of the imminent prospect of recapitalisation.

The banks' plight arises from mounting losses on their loans. Between the middle of 2012 and of 2013, the ratio of non-performing to total loans rose from 13.2% to 17.4%, which is the highest level in the euro zone after Greece and Ireland (see chart). The bad debts have been incurred predominantly through lending to businesses. Slovenia's firms are weighed down by debt, which is particularly high in relation to equity.

Only the state can provide the funds needed to recapitalise the banks. It wants them to transfer a big chunk of their bad loans to a state-run "bad bank", for much less than their original value. The government will then plug the hole that this leaves in the banks' balance-sheets.

But that will be expensive. The €1.2 billion (\$1.6 billion) the government has set aside for this purpose is widely considered inadequate. The bond markets, by and large, have given Slovenia a cold shoulder for over two years. As a result, it has had to resort to unusual manoeuvres, such as borrowing in dollars rather than euros. Although public debt is below the euro-zone average, it has jumped from 22% of GDP in 2008 to 63% this year. The IMF has estimated that recapitalising the banks could raise public debt by another 11% of GDP.

In this respect Slovenia is a textbook case of the problem that has plagued other parts of the euro zone: the link between weak banks, which governments end up



recapitalising at great expense, and weak government finances. It was severe banking crises that pushed Ireland and Spain as well as Cyprus to call for help.

But Slovenia's predicament also arises from its history. It has been slower to dismantle public ownership than Europe's other formerly communist countries. Most notably, the three biggest banks are all still state-controlled.

That has left a tangle of relationships among state-owned enterprises, some within the financial sector and some outside it. Bostjan Jazbec, the governor of the central bank, calls this flawed system of corporate governance the country's "original sin". Slovenians, he explains, thought there was a third way between a centrally planned economy and a market-oriented one. Previous governments, perhaps lulled

by Slovenia's relative prosperity, resisted privatisation. Partly as a result, Slovenia has also failed to attract growth-spurring foreign direct investment, which is much lower as a share of GDP than in comparable countries.

Reforms are under way to sort out the mess. The government is amalgamating its various stakes in banks and other businesses, which are held both directly and indirectly through funds. Next year it will identify the holdings that are "strategic", with the intention of divesting those that are not. Already, 15 companies are being privatised. And changes to insolvency, including a new out-of-court procedure, will make it easier to reduce debt through arrangements like debt-to-equity swaps.

These reforms matter in substance, but they are also an important signal of political resolve. The markets' view of the government's determination will be crucial in the weeks ahead. If the amount needed to recapitalise the banks appears both credible enough to restore them to health and feasible enough for the government to finance, then things could go Ms Bratusek's way. Confidence may begin to return, allowing Slovenia to regain more regular and less costly access to bond markets.

But the economy is continuing to slide. This year GDP will fall by 2.7%, bringing the cumulative decline since 2008 to 11%, the same as in Cyprus, and exceeded in the euro area only by Greece's horrifying 23%. Along with Cyprus, Slovenia is the only euro-zone country forecast by the European Commission to stay in recession in 2014, when output is expected to fall by a further 1%. Such a dismal performance will amplify both the tally of bad loans and the strain on the government's accounts, whatever the result of next month's audit. ■

Investing in commodities

Rust-proof

Despite a tarnished record, commodities have not lost their lustre for all

GRAIN silos, oil pipelines and copper smelters are not exactly glamorous. Yet for a glorious couple of years up until mid-2008, commodities were all the rage. China was booming, and supplies of everything from soyabeans to iron ore were failing to keep pace, prompting a giddy leap in prices. Financial engineers minted all manner of products tied to these movements. Not only were commodities on a roll, their patter went; they also provided a crucial hedge for any diversified portfolio, since they did not move in tandem with other assets.

This spiel convinced all sorts of big investors to pile in. Pension funds, endowments, sovereign-wealth funds and the like scrambled to grab a piece of the commodities boom, only to see prices wobble along with the world economy, and then slip as China's growth slowed. Yet overall investment in commodities has barely fallen, even though the sales pitch that drummed it up has been largely disproved.

According to Barclays bank, the flood of investment in commodities reversed only slightly this year (see chart, next page). If gold, which behaves more like a currency, ►►

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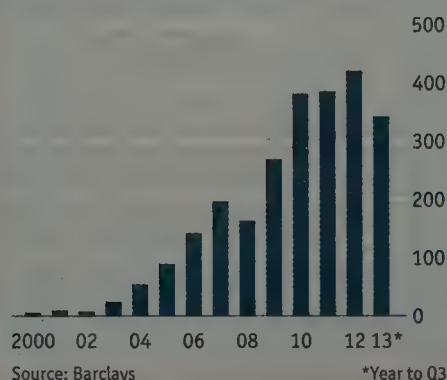
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Metal fatigue

Commodity assets under management, \$bn



is left out of the picture, the sum of commodity-related assets under management has hovered at a little under \$220 billion since 2011.

Falling commodity prices, thanks both to increased supply and to slower economic growth in emerging markets, have called into question the long-term return that the burgeoning asset class was presumed to offer. But that is not the only reason that investors have gone lukewarm on commodities. The role of raw materials as a hedge against rising prices remains untested and unimportant while inflation stays stubbornly low.

The supposed power of commodities to diversify portfolios has also failed to match the billing. In the decades leading up to the financial crisis there had been no consistent correlation between returns from commodities and other investments. But the crisis hit all types of asset. Commodity indices and the S&P 500 moved more or less in sync. Commodities, in other words, were no hedge against economic cataclysm. It is little comfort that the link seems since to have been broken again, as equities have prospered while commodities have not. Indeed, historically, commodities have yielded little return except during the oil crises of the 1970s and the heady years before prices peaked in 2008.

These disappointments have provoked retreats from some prominent advocates of commodities. A few big commodity-focused hedge funds have closed and several investment banks are getting out of the commodities business. CalPERS, a giant pension fund for state employees in California, which helped to cement commodities' status as a mainstream asset class with a big investment in 2007, cut its exposure late last year from 1.4% of its total assets to a niggardly 0.5%. But it says this reversal may only be temporary, and other investors continue to pile in.

Indeed, some boosters argue that commodities' time will come again. Nick Brooks of ETF Securities, a commodities-investment firm, senses tentative interest and reckons a small recent inflow of investors' cash might herald better times.

Kevin Norrish of Barclays also sees reason for optimism. Both reckon that investors in commodities are becoming cannier. Although most still bet on simple price rises, the more sophisticated are exploring subtler strategies to eke out returns, tied to relative movements in price between different commodities, for example. As a fairly new and little-studied asset class, more research might boost returns.

Of course, across-the-board price rises would provide the biggest boost. Mr Norrish says that commodities tend to perform better in the later stages of an economic recovery. That still looks some way off. Worse, China is unlikely ever to return to the tearing growth that sent commodity prices skyward a decade ago. But miners are cutting investment and oil production growth is sluggish. So there is a chance that prices will rise again and commodities will swing back into fashion. ■

Small-town banks in America

Wonderful while it lasted

ERIE, PENNSYLVANIA

A successful local bank finds it no longer pays to hold on to the mortgages it issues

BANKERS have a rough time of it in Hollywood on the whole. But in 1946 "It's a Wonderful Life" depicted the Platonic ideal of a small-town bank, with managers and customers who knew each other, and tried to help each other through tough times. Most banks pay lip service to such goals, but fall laughably short of them in practice. Marquette Savings Bank, the last remaining lender headquartered in the once-booming industrial city of Erie, could

make a more plausible claim than most—until distant regulators and policymakers undermined its personal approach.

A visit to Erie in the months before Christmas reveals two different economies. Canadian shoppers fill the local malls to take advantage of Pennsylvania's lack of sales tax on clothes; meanwhile, high corporate taxes and demanding trade unions have chased away manufacturers. The region is littered with grand but derelict banks that used to cater to them.

In contrast, Marquette, a 110-year-old mutual, is thriving. It has nearly doubled in size since the crisis, to \$800m in assets; its profits have almost tripled, to \$8m. It has 12 branches, up from 7 in 2007.

Marquette's website features a photo of each branch manager and every foreclosed home put up for sale (there are currently seven). Up until the crisis it followed the "It's a Wonderful Life" model, holding on to the mortgages it had originated instead of selling them to government-sponsored entities, as most banks did.

Marquette's survival, therefore, depended on the quality of its appraisals of borrowers and homes. Its approach was to have a lending officer accompanied by one of the bank's trustees (board members, in effect) visit every mortgage applicant on the Saturday after each application was filed. Customers received fast decisions; managers and trustees learned a lot about their clients and market conditions.

Holding on to loans is a risky strategy for a small-town bank, primarily because it ends up extremely vulnerable to a fall in local property prices. Marquette emerged stronger from the crisis in part because property in Erie, which had not enjoyed as much of a boom as the rest of the country, dipped only slightly. But its careful vetting of loans and strong ties to its customers presumably also made a difference. ►►



Where Plato would have applied for a mortgage

Given Erie's size (the city and suburbs have a population of 280,000), Marquette's controls sometimes involved difficult decisions about friends and neighbours. Given its inclement weather, they often involved slogging through heavy snow. As Marquette grew and expanded into an adjoining county, visiting potential borrowers became more arduous.

But it was the changing regulatory climate, rather than Marquette's growth, that put an end to its assiduity. Its overseers wanted it to sell its mortgages to protect itself from swings in property prices. Moreover, the Federal Reserve has indicated that its policy of suppressing interest rates will not last for ever. Higher rates will reduce the value of Marquette's mortgages. So it has started selling them to the Federal Home Loan Bank of Pittsburgh, part of a 12-bank network which raises money cheaply in the capital markets because of implicit government backing.

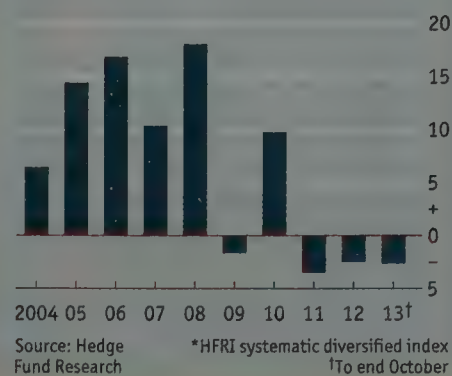
The subprime crisis revealed so much slapdash issuance that buyers of mortgages consider valuations provided by the originators worthless. So Marquette can no longer conduct its own appraisals. Saturday visits have ended, along with the fast turnarounds on mortgage applications. It now takes a month.

Marquette's strong results suggest the changes have not hurt. Then again, defaults are falling across America, thanks to the improved economy. The real test will come with the next downturn.

During the crisis the Pittsburgh Home Loan Bank lost money on mortgage bonds it had purchased. It is suing Standard & Poor's, a credit-rating agency that had provided a positive evaluation of them. Numerous other entities that purchased mortgages are doing the same. Meanwhile, the old-fashioned way of making sure that loans do not sour—by being careful about issuing them—is disappearing. ■

Quantitative easing

Trend-following hedge funds*, total returns, %



world's wildest supercomputers can predict what the European Central Bank will dream of next, apparently.

Worse, such interference prompts stocks, bonds and commodities to move in unison. When in May the Federal Reserve hinted at a "tapering" of America's ultra-loose monetary policy, for example, both government bonds and shares tumbled. What had started out as a good year for the trend-followers turned into a drubbing. One of the sector's main selling-points, that its returns are uncorrelated to those of other asset classes, is at risk.

The quants are remarkably sanguine about their recent record. "Performance since 2009 in traditional strategies hasn't been great, but it's no disaster either," says Sandy Rattray, AHL's boss. Many of the stock-picking hedge funds that had been lionised for making money in the crash suffered large losses in subsequent years, he points out. Low interest rates, which depress returns on the safe assets quants hold as collateral to back their trades, have not helped.

The big unknown is whether trend-following will ever work again. The quants are adamant that the models are simply in hibernation. Profits will return, they say, as soon as prices revert to being dictated by investors rather than policymakers. "Imagine where bonds would be trading if it weren't for the interference," says Leda Braga of BlueCrest.

Some wonder whether the growth of quant-fund investing has irreparably harmed returns. Decent trend-following algorithms can be bought online. Some of the funds are adapting in response. Winton, the biggest, now invests some of its cash in equities; it is among the few to have risen in value this year, albeit modestly. AHL is focusing its energies on trading in more esoteric markets, like German power or iron-ore futures, which it hopes are less crowded. Yet it is hard to find markets that are immune to political meddling, or politicians who are inclined to let the forces of finance be. Trend-followers may yet prosper again, but the breakout point, as it were, may be some way off. ■

"Quant" hedge funds

Computer says no

Hedge funds looking to spot and ride market trends are hoping for a fresh start

IF SOMETHING has not worked for five years, most people would conclude that it was broken. Tell that to the geeks managing "quant" hedge funds, who craft elaborate algorithms to profit from market movements. Once money-spinners, their prized formulae have misfired since 2009, losing money in four of the past five years. Unless their results improve markedly, the giant funds will finish this year as the worst-performing of the most common hedge-fund strategies.

"Trend-following" involves programming computers to analyse market movements and try to infer where they might go next. Practitioners speak with reverence of "crossover levels" and "momentum speeds" leading to "breakout points". A rough translation is that a trend that lasts a few days or weeks can profitably be invested in until it reverses, at which point a new trend may already be forming. Whether the markets are going up or down does not matter. Nor does the underlying asset being analysed—typically a futures contract linked to a commodity or a security.

After prospering through the market rout of 2008 (the prolonged slump gave even the dimmest trend-follower time to cotton on), the sector swelled from \$91 billion to \$215 billion, according to Hedge Fund Research, a data provider. Winton Capital, Man Group's AHL fund, Cantab, BlueCrest and other "black box" traders, as



their critics dub them, became darlings of the investing world. Unfortunately, the influx of investment coincided with the reversal in the strategy's fortunes (see chart).

The main problem is not with the quants' models, practitioners insist, but with the markets themselves. In the aftermath of the financial crisis, they have been dancing to the tune set by politicians and central bankers. Efforts to save the euro or stave off deflation regularly send markets into convulsions, in the process distorting the historical patterns that the algorithms are designed to exploit. The ensuing jolts and crashes have no precedent, leaving even the most finely crafted trade at risk from political meddling. Not even the

Free exchange | A reasonable supply

Those who argue that China's investment binge is unsustainable are overstating their case

TO BECOME rich, poor countries must enlarge their productive powers, mobilising workers, absorbing new technology and accumulating capital. They must expand what economists call the "supply side" of the economy, which determines how much a country can produce, and therefore how much it can earn and spend.

The other side of the economy—demand—can also intrude on the story. In the course of development, poor countries often struggle to keep spending in check. They are prone to inflation and trade deficits, which must be financed by foreign borrowing. Sometimes these excesses result in a financial crisis that leaves demand in the dumps and supply in disarray. Simply put, successful development entails expanding supply as quickly as possible without allowing demand to grow even faster.

China's policymakers fret a great deal about the supply side of their country's economy. They worry about accommodating the flow of rural migrants to the cities, amassing the physical infrastructure appropriate to their ambitions, and upgrading the country's technology. Such concerns fill their five-year plans and 60-point plenary resolutions.

Critics of China's growth model, in contrast, tend to focus on the demand side. This is not because China's spending is too strong. On the contrary, China's domestic demand has fallen short of supply in 22 out of the last 23 years, and inflation last year averaged under 3%. China's critics worry instead about the composition of China's demand. Household consumption accounts for too small a share and investment looms too large. If this imbalance is not corrected, they argue, China may eventually suffer from an investment bust, causing a sharp slowdown in spending—perhaps even a contraction.

Among the most prominent critics of China's economy is Michael Pettis of the Guanghua School of Management at Peking University. Investment, he points out, accounts for a dizzying 48% of China's spending (see chart 1). Investment plays a dual role in development, adding both to demand and, when projects reach fruition, to supply. But China's high rates of investment are nothing to celebrate, Mr Pettis argues in a recent book.* They are both excessive and misdirected. As a consequence China is misallocating capital on a grand scale.

Much of the investment is financed by bank loans and other kinds of debt. In principle, it should create useful assets that have a higher economic value than the liabilities incurred to finance

them. But if the investment is misconceived, the debts will prove difficult to repay. Perhaps four or five years from now, Mr Pettis believes, China will reach the limits of its "debt capacity" and suffer a sharp slowdown in capital expenditure.

Consumption will not be able to compensate for this drop-off in investment, Mr Pettis argues. Household spending accounts for only about 35% of China's demand. Thus even if it were to grow by about 10% a year, it would contribute only 3.5 percentage points to China's growth. This simple arithmetic once prompted Mr Pettis to predict that China's "average growth in this decade will barely break 3%". He was even prepared to bet on it, entering into a lighthearted wager with our Free exchange blog. In his book, he says it will not exceed 3-4% for the decade after 2012-13, a subtle shift in position.

Losing interest

Consumption is suppressed by a variety of mechanisms that deprive households of income and transfer it to corporate borrowers. The most powerful, in Mr Pettis's opinion, is the cap the government places on the interest earned by household deposits in banks. One might think that low interest rates would encourage consumption by reducing the reward for saving. But the evidence suggests that Chinese households save to meet certain goals, such as making a down-payment on a home. If saving yields little, they simply do more of it.

Mr Pettis thinks of this "financial repression" as an invisible tax on household saving, which might amount to as much as 8% of GDP. In a thought experiment, Mr Pettis imagines China's government taxing half of household income to build bridges to nowhere. This, he rightly points out, would be unfair to households and a colossal waste of resources. But it would not lead to unsustainable debts, as he claims, since the bridges are financed with taxes, not by debt.

China's investment binge can endure because the saving that China taxes exceeds the investment it subsidises. Many of China's companies are heavily in debt. But as a country, China consistently spends less than it earns, generating a current-account surplus and adding to its foreign assets.

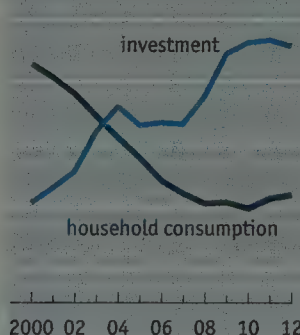
China is, then, living within its means. And those means are now considerable. It produces over \$8 trillion-worth of goods and services, without undue strain on its capacity. There is little question that capital does not always go to the most deserving investment, and that the lives of China's citizens would be more comfortable if consumption played a bigger part in the economy. But China's capital stock still seems more productive than Thailand's or South Korea's (see chart 2). And even if investment is stripped from the figures and countries are ranked solely by the remaining components of GDP (namely consumption and net exports), China is still the world's second-biggest economy.

Whatever its flaws, the development of China's supply side is undoubtedly impressive. It boasts an industrious, mobile workforce, ingenious entrepreneurs eager to absorb new tricks and serviceable, even occasionally lavish, infrastructure. The demand side of its economy, if China's critics are to be believed, is more precarious. But it is hard to think of a developing economy that has been held back for long by a shortage of demand. ■

* "Avoiding the Fall: China's Economic Restructuring". Carnegie Endowment.

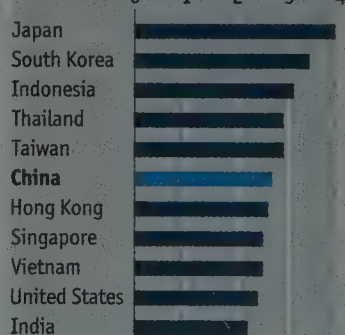
Bingeing, but not wasting

China's:
As % of GDP



Sources: Haver Analytics; APO

Capital stock relative to GDP
2011





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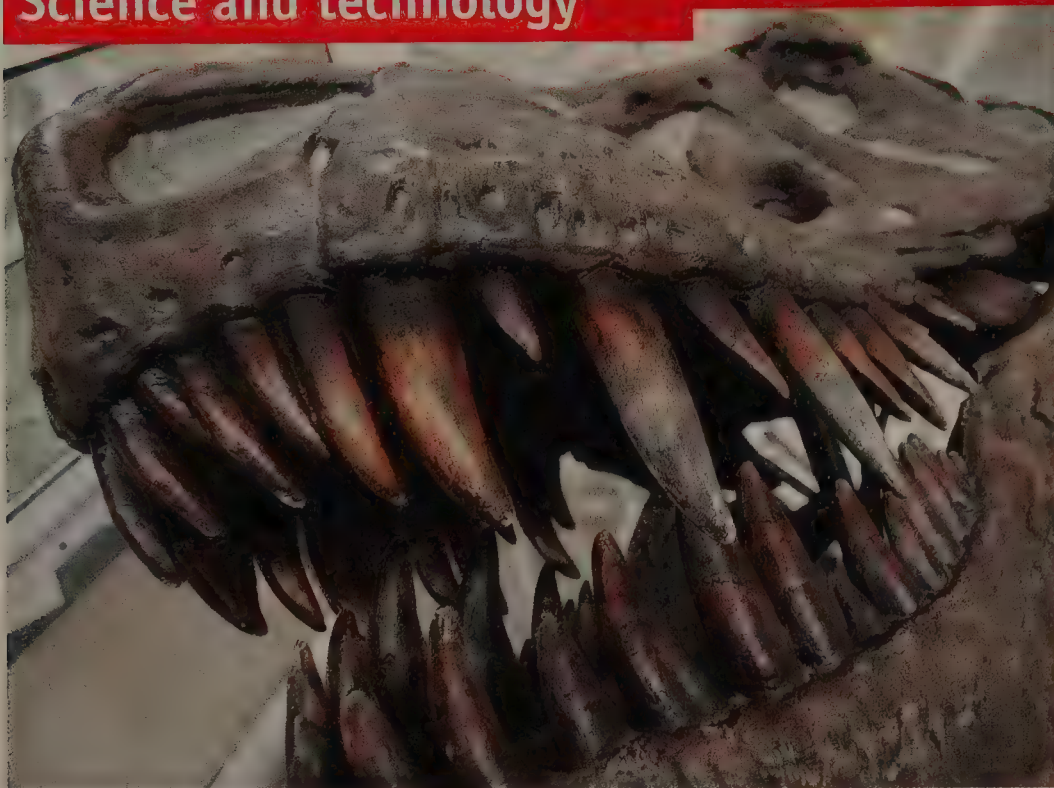
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Palaeontology

Life in the old fossil yet

How remnants of dinosaur tissue have survived for millions of years

WHEN most animals die, nature likes to tidy up by making their bodies disappear. The remains get eaten by scavengers, bones are scattered, tissues rot away and anything left over tends to get destroyed by the elements. Very occasionally, though, these destructive processes get disrupted. This usually happens when the corpse is quickly buried by sediment deposited by a river or blown in by the wind. Then begins a slow process in which minerals precipitate from groundwater into the encased organic material, eventually replacing it with a stony replica: a fossil.

Such was palaeontological doctrine for decades. But in recent years traces of soft tissue, such as blood vessels and bone cells, have been found in some dinosaur fossils. Now researchers have come up with an explanation for how these tissues were preserved for millions of years, which just might make it possible to extract some elements of prehistoric DNA.

That there was more in a fossil than meets the eye emerged in 2005 when Mary Schweitzer, a palaeobiologist at North Carolina State University, found something unusual after her team used acid to dissolve minerals from a fossilised piece of *Tyrannosaurus rex* bone. Left behind were some fibrous tissue, transparent blood vessels and cells. Many argued that this material must have come from modern bacteria and not a *T. rex*, since nothing organic

could possibly survive the 68m years since the creature had walked the Earth.

In 2012, however, Dr Schweitzer and her colleagues went a step further, revealing the presence of proteins in a dinosaur fossil that had been freshly dug up and carefully protected from any potential contamination. Moreover, one of the proteins the researchers identified could be found only in birds. Since dinosaurs were the ancestors of modern birds, the discovery made it hard to argue that soft-tissue material in the fossil could have come from bacterial contamination. Still, many scientists wondered how such a thing was possible.

Cast-iron evidence

In a new report in *Proceedings of the Royal Society* Dr Schweitzer and her colleagues collaborated with a team led by Mark Goodwin, a palaeontologist at the University of California, Berkeley, to seek an explanation. Organic material from dinosaur bones was studied using micro x-ray absorption spectroscopy, which allows scientists to examine the structure of matter using intense light beams. This led Dr Goodwin to notice something remarkable: the organic material in the samples was thickly laced with iron nanoparticles. In animals, iron is most commonly found in blood and this led the researchers to wonder if the iron had come from blood cells that had once flowed through their dino-

saur's veins. Could it have played a part in the preservation of the tissues?

To test this idea, the researchers designed an experiment using freshly slaughtered ostriches which, being large and flightless birds, seemed to be a reasonable modern equivalent to dinosaurs. They extracted blood vessels from the bones of the birds and soaked them in a haemoglobin solution obtained from ruptured ostrich blood cells for 24 hours. The samples were then placed in both a saline solution and sterile distilled water. As a control, some of the blood vessels were put straight into saline solution or water without being pre-soaked in blood.

As expected, the ostrich tissues that went directly into the water and the saline solution fell apart rapidly and were entirely consumed by bacteria or heavily degraded in just three days. The same thing happened to the tissue soaked in haemoglobin and placed in water. But the treated sample in the saline solution remained intact and has stayed that way for two years now, with no signs of bacterial growth.

Dr Schweitzer and Dr Goodwin believe that highly reactive ions known as free radicals, which are produced by iron as it is released from the haemoglobin, interact with the organic tissue causing abnormal chemical bonds to form. These bonds effectively tie proteins in knots at the molecular level, much as the preservative formaldehyde does. This knot-tying makes the proteins unrecognisable to the sorts of bacteria that would normally consume them. This, they theorise, is how the soft tissues manage to survive for millions of years without rotting away.

The iron nanoparticles, however, may be doing more than just preserving tissues. Despite what happens in the science fiction world of "Jurassic Park", no dinosaur ►►

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Genetics

Junking the idea of junk

A newly recognised class of genes really does matter

GENETICS often progresses by breaking things. Early experiments used naturally broken genes—mutations—to work out the basic rules. Then geneticists found out how to induce mutations with radiation and chemicals. That gave them more material to work with, but the mutations still appeared at random. Then the “knockout mouse” was invented, in which mice have specified genes rendered inoperable, thus revealing their functions. Now, as they write in *e-life*, John Rinn of Harvard University and his colleagues have used the idea of knockouts to prove that certain bits of DNA once regarded as junk are proper genes after all.

The DNA in question is propagated by being copied—as are all genes—into a similar molecule called RNA. In the case of conventional genes this RNA is then “translated”, in a subcellular machine called a ribosome, into a protein. Dr Rinn’s RNA—a type known as long intergenic non-coding RNA, or lincRNA—is not so translated. Geneticists used to assume that this meant it was useless. Now they know different: it actually goes off to do jobs uniquely suited to the chemistry of RNA itself. How important those jobs are, though, has been much debated. Dr Rinn has just demonstrated, by knocking out 18 lincRNAs, one at a

time, and observing what happened to the mice in question, that they can be very important indeed.

In three cases the answer to the question “what happens when you knock out this gene?” was: no mouse. Knockouts work by mating males and females that each have one functional and one non-functional version of the gene under investigation (each having been derived from a different parent). A quarter of their offspring will thus have two non-functional copies, and whatever job the gene does will therefore not get done. If this job is vital, the embryo will die in utero and no mouse pup will be born. That was what usually happened in the case of genes called *linc-Foxf1a*, *linc-Hoxd3* and *linc-Sox2*.

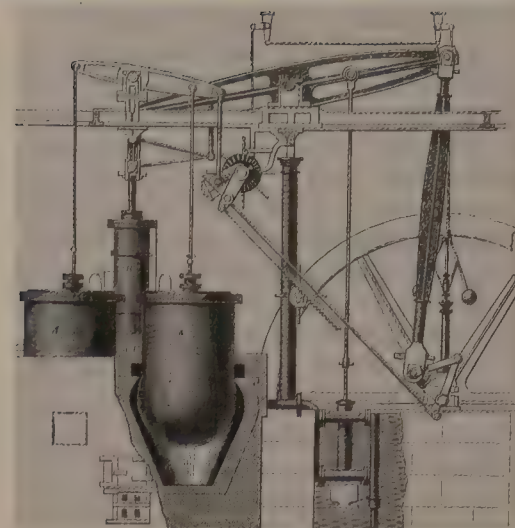
In two other cases, the embryos did come to term, but they were a lot smaller than they should have been. The guilty genes here are called *linc-Pint* and *linc-Brn1b*. LincRNA, then, really does matter.

Dr Rinn and his colleagues followed up one of their newly discovered examples in detail. *Linc-Brn1b*, they found, is involved in brain formation. Without it, the layers of the cortex do not develop properly. These knockouts therefore, in Dr Rinn’s view, do indeed knock out once and for all the idea that lincRNAs are not proper genes.

precisely where it had resided during life.

As to whether any DNA strands can ever be read remains to be determined because of the complex knots that they have been tied into by the iron. But Dr Schweitzer and Dr Goodwin plan to try. Many things other than iron tie proteins into knots. One is sugar which, when exposed to tissues in high enough concentrations, can also cause abnormal bonds to form. This process damages tissues in diabetics. Some doctors suspect the process might be reversible by using drugs, like N-phenacylthiazolium bromide, that selectively cleave abnormal bonds while leaving normal ones alone. With this in mind, the researchers are considering trying some of these drugs on their dinosaur proteins to see if they can untangle them.

In the end, such tactics will not be quite as poetic as Hollywood’s notion of collecting dinosaur DNA from bloodsucking mosquitoes preserved in tree sap. But if it results in sequencing even part of the genes of a *T. rex* to determine more about these and other prehistoric animals, then no one is going to mind. ■



Heat engines

Stirling silver?

A 200-year-old invention may at last be ready for market

THE Stirling engine, the brainchild of a 19th-century Scottish clergyman, is an invention that seems cursed by the gods of innovation neither to succeed nor to fail comprehensively and thus be forgotten. In 1816 Robert Stirling patented a device he hoped would sweep aside the then-dominant “atmospheric” steam engine. Instead of a messy process of using steam to make a vacuum beneath a piston, thus causing atmospheric pressure to drive the piston down, Stirling’s version (illustrated above) uses the heating and cooling (and thus expansion and contraction) of gas sealed inside the engine to do the piston-driving.

Engineers love the idea for its elegance. But it did not appeal to the industrialists who were its intended market. They preferred the tried and trusted way commercialised by James Watt. Nor, when given a second chance by the revolution which ousted steam in favour of the internal-combustion engine, did Stirling’s invention manage to redeem itself.

But engineers are a cursed bunch and have found, over the years, a few niche applications for various forms of Stirling engines. One version, called a free-piston engine, runs backwards: it uses mechanical energy as the input, rather than the output, to pump heat away from where it is not wanted. In other words, it is a refrigerator. These specialised fridges chill the infra-red sensors on orbiting telescopes. On the basis of that success, some engineers believe free-piston engines can be brought down to Earth and deployed in a less *recherché* role. They think them ideal to replace Rudolf Diesel’s smelly, polluting motors in the generators that provide electric power to the countless tropical villages not yet con- ▶▶

▶ DNA has yet been found. The reason for this is that DNA is thought to have a half-life of 521 years, which means that, after that much time, half of the bonds between the proteins that make up DNA have broken apart; after another 521 years, another half have gone, and so on. This leaves very little behind after hundreds of thousands of years yet alone the 65m years or so that stand between humanity and dinosaurs. Even so, Dr Schweitzer and Dr Goodwin still wondered if the iron-based preservation process might allow DNA to bypass its typical half-life and last a lot longer.

To find that out, the team used an iron-removal compound known as pyridoxal isonicotinic hydrazide to delicately pull iron away from the dinosaur tissues without damaging them. They then added four different stains that react only with either DNA itself, or with proteins closely associated with it in organisms other than microbes. Remarkably, in all cases, these specific stains lit up inside the ancient cells in the tissue samples. This hints that something chemically very similar to DNA can remain in a fossil and might yet be hidden

► nected to their countries' national grids.

Two groups in particular are planning to do this. One is at Sunpower, an American company founded by William Beale, the principal inventor of the free-piston design. The other is at the University of Oxford, and is led by Paul Bailey, Mike Dadd and Richard Stone. Both have previously built and deployed satellite-cooling systems, and both now plan to use free-piston engines to drive electricity generators.

From a user's point of view the Stirling approach has two advantages. One is that because, like a steam engine, a Stirling is an external-combustion engine, it can run on a variety of fuels. Both designs can thus be powered by wood, dried animal dung or more or less anything else that will burn.

The second advantage is that a free-piston engine suffers little wear and tear, so it should be able to run for a decade or more without servicing. (One of the Oxford group's designs has already survived for 15

years in the harsh environment of space.) This is because cylinder and piston are in line with the alternator that they drive in order to produce the electricity, eliminating the need for a crankshaft, and also because an external-combustion engine does not have to withstand the continual explosion of fuel inside its cylinder, so it can use special bearings that greatly reduce wear.

Such a design can be powered by nothing more than sunshine concentrated by a concave mirror. That approach was being employed by Infinia, an American firm. Unfortunately, despite having a contract to build a solar farm containing 429 of the things for the American army, Infinia filed for bankruptcy protection. This may prove just a glitch; Qnergy, an Israeli-based producer of Sterling engines, recently acquired Infinia's assets. But even two centuries after the first heroic failure, it does suggest that the curse of Robert Stirling has still not quite been lifted. ■

Spring-cleaning outer space

Belt up!

Scouring electrons from near Earth could prolong satellites' lives

THE Van Allen belts, which were discovered in 1958 by some of the first artificial satellites, are a bane of those satellites' successors. The outer belt, which begins at an altitude of 13,000km above Earth's surface and goes up to 60,000km, is full of energetic electrons. The inner one, at 1,000-6,000km, is full of energetic protons. Both play havoc with satellites' electronics.

But what if you could sweep them away? This is the ambition of Reinhard Friedel, a physicist at Los Alamos National Laboratory, in New Mexico, and his colleagues. Dr Friedel reckons you could do the job with radio waves. In principle this should work because the gap between the inner and outer belts is maintained by natural radio waves from things like lightning.

Particles in the Van Allen belts are constantly on the move, following the lines of Earth's magnetic field towards the poles, gyrating as they travel. As they approach a pole, however, the laws of electrodynamics that govern the behaviour of gyrating particles force them to reverse their direction and head back towards the opposite pole. If a particle is moving towards a pole faster, it will come closer to Earth before bounding back and is more likely to hit an air molecule. If it does so it is, to use the jargon, "precipitated" into the atmosphere where it gives up its energy and never returns to space.

So the way to sweep the Van Allen belts clean of their troublesome electrons and protons is to bombard the particles with radio waves at a frequency that speeds them up as they head towards the poles. Protons are heavy and influencing them requires a lot of power. So sweeping the inner belt may be impractical. Electrons, however, are much lighter. That means a spaceborne particle-sweeper for the outer Van Allen belt is a possibility, according to Dr Friedel. He reckons it would cost about \$500m to launch and operate for 15 years. Not all satellites would benefit. But many, including all the geostationary communications satellites, have to contend with electrons in the outer belt. Sweeping could extend the life of all GPS satellites by two years, saving about \$22m per satellite, or \$660m in all.

The scheme is ambitious, but not foolhardy. Some talk of clearing larger chunks of space debris to stop them crashing into satellites. That would be hard. Sweeping away the cloud of electrons that surrounds Earth could be a better investment. ■

Comet ISON

The perils of sungrazing

The "comet of the century" may be a great spectacle, or a damp squib

AMATEUR stargazers have been hoping for a bright Christmas. If all goes well in the coming weeks then a comet called C/2012 S1—better known as ISON, after the Russia-based International Scientific Optical Network, which discovered it—could be lighting the night skies in one of the most spectacular displays seen for many a year.

Like all comets, ISON is a spacegoing snowball; a hunk of water ice, dust and pebbles. The path the comet is taking through the sky suggests that it has come all the way from the Oort Cloud, a hypothetical sphere of rocks, boulders and other detritus that extends up to a light-year from the sun and which marks the outermost edge of the solar system.

It is also what is known as a "sun-grazer", which means that the comet will come very close to the sun. As *The Economist* went to press, ISON was making its closest approach and was predicted to pass around 1.1m km from the solar surface. As comets approach the sun, the rising temperature begins to boil them away, producing the spectacular dusty tails for which they are best known. ISON's should be visible to the naked eye from both hemispheres in December, as it heads back out of the solar system—assuming, that is, it survives its encounter with the sun.

Which it may not. The latest data suggest that ISON may have split apart under the stress of the sun's heat and gravity. If that is true (presently, no one is



Cracking up in the heat?

quite sure), then any December light show put on by its remnants will probably fall far short of the "comet of the century" that many had been predicting.

Even if it turns out to be an aesthetic damp squib, though, astronomers will still learn a lot. Comets like ISON are not very common. Besides the ground-based instruments being used to study it, a small fleet of space telescopes and robotic probes have also been pointed at it. As a NASA blog put it: "Remember: Comet ISON is a dynamically new sungrazing comet, fresh in from the Oort Cloud, and the last time we saw an object like this was never!"



Joel Rosenthal at the Metropolitan Museum

Hidden treasures

NEW YORK

A cult jeweller gains a much wider audience—rather imperiously

IN 1978 Joel Rosenthal, then a fledgling designer with a passion for gems, opened a small shop off Place Vendôme in Paris. He and Pierre Jeannet, his partner, named it JAR after the designer's initials (his middle name is Arthur). Mr Rosenthal, who was born 70 years ago in the Bronx, says, "I wanted to fall flat on my own face or make my own name."

He certainly succeeded in the latter. Mr Rosenthal is insistent that he had no powerful backer, either social or financial. Passers-by were not encouraged to drop in. The only publicity was word of mouth. Yet the famous and the rich soon found their way to his door, lured by the uniqueness of his creations.

The jeweller combs the world for quality gems, constantly expanding his range with unusual, even unfashionable stones, including green garnets, pink sapphires and black diamonds. His pieces are often unusually large and deeply three-dimensional. A brooch of two life-size, gem-laden lilacs is instantly recognisable as being by JAR. These are jewels for the chauffeur, not for those who need coats.

Mr Rosenthal has written that "beauty, art and luxury are inseparable from happiness." His prices are not listed, though there are clues. In May 2012 Lily Safra, a philanthropist, auctioned 18 of her JAR pieces at Christie's in Geneva in aid of

charity. They fetched nearly \$11.5m. Among them was a 37.2-carat diamond she had brought to Mr Rosenthal. "I can camouflage that," said the charmer, who can also be blunt. He wrapped it in the twisting stem of two poppies made of pink and green tourmaline (pictured).

Eleven years after his only public show so far, at London's Somerset House, Mr Rosenthal is about to become better known. Some 400 pieces are on view in "Jewels by JAR" at the Metropolitan Museum of Art. Many were made over the past decade and all are loans. This is the jeweller's first American retrospective and the museum's first display of "a contemporary artist in gems". Tom Campbell, the director, believes people will see how the Met's jewellery collection, which spans 2,000 years, has influenced Mr Rosenthal. In turn, JAR's jewels will enable them to see the Met's collection "with fresh eyes".

These adornments and *objets d'art*, ranging from an amusing engraved bagel made of wood to a translucent amber pocket watch, occupy a single, spacious oval gallery. The walls are dark salmon in colour. The light is dim except inside the velvet-lined vitrines, which line the gallery's perimeter and also stand freely within the central space. The effect is dramatic.

The pieces are loosely arranged by category: flowers, animals, sea life. There

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are plump ruby roses and camellias from a fairy-tale garden. In one small vitrine a flat-faced hellebore covered in diamonds and violet sapphires rests alongside its case—a round snowball made from a smoky rock-crystal studded with diamond snowflakes; apt for a flower that is also called the Christmas rose. In JAR-land even the ferns are paved in diamonds. Among the beasts, a soulful zebra-head brooch carved from agate wears a diamond halter and plumed headdress. The exhibition ends with a wall of butterfly brooches, each one larger-than-life-sized and closely set with intensely coloured gems—including fire opals, amethysts and garnets.

Mr Rosenthal wants visitors to look at his creations without being distracted by long explanatory captions or audio guides. This is effective; all attention is on the jewels. But the Met is not a shop where such a presentation would suffice. There ought to be a catalogue, for instance, with information about the rarity and source of the gems, comparisons with JAR's most inventive contemporaries and comments from clients about commissions. Instead, the museum shop is offering only luscious picture albums (a short one with a biographical essay priced at \$40 and a giant edition, which costs \$800).

The museum deserves praise for exhibiting the work of an exceptional living jeweller, but not for letting him call the shots (even basic information, such as the size of the pieces, is missing). This is a sensational advertisement for JAR, as well as a fantastical, occasionally funny show, which is often very beautiful. For the visitor, that is both terrific—and not enough. ■

"Jewels by JAR" is at the Metropolitan Museum of Art, New York, until March 9th

Genetics and education

Nurturing nature

G Is For Genes: The Impact of Genetics on Education and Achievement. By Kathryn Asbury and Robert Plomin. Wiley-Blackwell; 216 pages; \$24.95 and £16.99

AT THE heart of “G Is For Genes” is a question: what, in essence, is equality in education? The answer, according to the authors, is that it is when everyone’s genetic endowment is given the maximum opportunity to flourish. The purpose of education, they believe, should be to identify that endowment and work with it, rather than imposing a one-size-fits-all approach to schooling. Their aim is laudable. But such a policy would sharpen the effects of genetic differences between children, rather than ironing out such differences—to many a controversial approach.

Robert Plomin, an American psychologist, is a doyen of the field of behavioural genetics, which seeks to understand how differences between people’s DNA influence their actions and capacities. Kathryn Asbury is one of his lieutenants on the Twins’ Early Development Study (TEDS), a project that seeks, among other things, to apply that approach to understanding children’s schooling. They believe, on the basis of this research, and that of others, that a large proportion of the differences in outcome at school are caused by genes. This is in contrast to the premise of the *tabula rasa*—that most children (at least those without special educational needs) are blank slates that have equal potential when they enter school. One consequence of the authors’ views is that, with rare exceptions associated with clearly identifiable conditions like Down’s syndrome, there are no special needs. In their view, every child is special, and worthy of a tailored curriculum.

As the book explains, TEDS has followed a time-honoured approach to behavioural genetics by comparing, statistically, identical and non-identical twins. Identical twins share all their genes. Non-identical twins share half. In both cases, though, the twins have a shared upbringing. This allows those running such a study to estimate the relative effects of genes and environment (and also, if they ask the right questions, of different aspects of the environment) on all sorts of phenomena, including how and what children learn.

Genetic effects on schooling are big. Up to 80% of differences in learning to read and write are genetic. For maths it is 60-70%. For science, 50-60%. A lot of the angry debate between environmental determinists and genetic determinists has



Child’s play

focused on how much of this is down to heritability of general intelligence (IQ, to the public; g, to practitioners). It is certainly important. But Ms Asbury and Mr Plomin show that other factors are also at play. One good predictor of a child’s success in a subject, for example, is his belief that he is good at it, regardless of how good he actually is. The level of such self-confidence is about 50% under genetic control.

One of the authors’ most interesting insights—an obvious one once you think about it—is that genetic and environmental influences are not simply additive. Genes actually shape the environment a child operates in. The sporty child seeks out the playing field. The studious one, the library. This amplifies the effects of genetic predispositions as a child ages.

Parental genetic endowment can also affect children who have not, through the vagaries of gamete formation, inherited the relevant DNA directly. It is uncomfortable, but true, that socioeconomic status is partly genetically determined (genes explain about 40% of variation between people in the status of the job they hold). It is also true that low-status households, for want of resources if nothing else, hinder a child’s development compared with those of middle-class families.

The authors argue that projects such as TEDS also show that perceived conditions, such as dyslexia and musical talent, are not distinct phenomena. Rather, they are the tail ends of statistical distributions that reflect the shuffling of myriad, tiny genetic effects called quantitative-trait loci, whose true nature is not yet understood. The result, as they put it, is that the abnormal is normal. It is indeed a weakness of the current state of knowledge that individual quantitative-trait loci have not yet shown up. This may change with an improved

understanding of genetics, particularly of the role of regulator genes called non-coding RNA, of which there are probably over 100,000, but whose existence had not, until recently been suspected (see page 79).

After this grand and sophisticated analysis comes prescription. Unfortunately, this is where the book falls down. Wise authors might have proposed ways the existing system could be reformed, preferably without an increase in budget. Instead, Ms Asbury and Mr Plomin prescribe a revolution—and an expensive one, at that.

Their big idea is that, because of all those quantitative-trait loci, every child needs a unique curriculum. This will be achieved in three ways. One is to use software to create personal tutors for all children, to work alongside their human teachers. Such software can adjust to a child’s progress. But, as the authors—who are adamant elsewhere in the book about the importance of basing policy on sound scientific evidence—admit, experiments using it have so far failed to show it produces better outcomes.

Their second thought is that each child should, in addition to teachers, have a “key worker” who would follow her through her school career, helping shape her curriculum. Again, there is no clear evidence this would work—and the idea of involving yet another state functionary in child-raising will not appeal to everyone.

Their third suggestion is to consolidate schools into institutions akin to “a small university campus”. This is to create the scale needed to offer all subjects in one place, making personal curricula possible. What that would do to a school’s *esprit de corps* the authors do not ask.

Automated teaching. Meddling bureaucrats. Giant schools. It might work. But it is unscientific to assert that it would. ■

The Warsaw uprising

Destruction

Warsaw 1944: Hitler, Himmler and the Warsaw Uprising. By Alexandra Richie. Farrar, Straus and Giroux; 752 pages; \$40. William Collins; £25

THE Warsaw uprising is a microcosm of the second world war and the impossible choices it imposed on people who bore no blame for the wickedness around them. The German occupation of Poland was a regime of unparalleled harshness, involving mass murder (particularly of Polish Jews) and the deliberate destruction of national spirit and culture. Against the odds, the Poles built a sophisticated underground administration and army, loyal to the exiled government in London.

But in 1944 it became clear that the oncoming Soviet forces wanted Poland to be communist, not free. Polish forces greeted them as allies and liberators, only to be locked up and killed. The thinking behind the uprising was that if the Polish underground could win control of the capital city from the Nazi occupiers, it would make it impossible for Stalin to ignore the country's lawful authorities.

That was always a long shot. The Germans were in retreat, but far from beaten. The Polish forces were lightly armed and ill-supplied. Stalin was in no mood to change his mind. Nor were his Western allies, eager to end the war before Germany developed new weapons, in any mood to let the alliance with Stalin fray.

The result was unconscionable. The Soviet troops, by then on the fringes of Warsaw, stood by until the Nazis had put down the Poles—a tacit echo of the original division of Poland between Hitler and Stalin in 1939. The uprising was crushed street by street and sewer by sewer, amid some

of the worst atrocities of the entire war.

Alexandra Richie's detailed and sympathetic history paints the foreground and background to this story. A Canadian-born historian who now lives in Warsaw, she takes an unashamedly polonocentric approach, rebutting the views of unnamed historians who, she hints darkly, have downplayed Polish valour and suffering. Some may find her account of the delights of pre-war Warsaw rather too rosy, and military historians may wish for a clearer account of the fighting itself.

But she bleakly sets out the central narrative: the poor leadership, flawed intelligence and bad planning which reduced the uprising's slender chances to nothing. The battle for Warsaw was ultimately a political, not a military event. It was part of a bigger story of Soviet machinations, allied pusillanimity and the desperation of the Nazi retreat, with a leadership panicked by the failed assassination plot against Hitler only weeks earlier in July 1944.

Ms Richie paints a particularly vivid portrait of the greatest villains of the story, the RONA, a Russian nationalist army recruited by the Nazis. It had briefly tried to set up an anti-communist Utopia in a tract of the Soviet Union. The rape, looting and carnage that these ragged, savage and desperate troops unleashed on Warsaw shocked even the ss. The book also traces the evolution in Nazi thinking as the uprising progressed: having derided the Poles as subhuman bandits worthy only of extermination, the Germans by the end gave the surviving combatants grudging respect.

The author is married to a Pole, the son of Wladyslaw Bartoszewski, a Jewish hero of the resistance who later became a leading dissident and then a distinguished foreign minister. "Warsaw 1944" draws heavily on her father-in-law's private archives and recounts many previously unpublished stories of the tragedy. Such survivors' testimony makes it the definitive study of the uprising.

Yet the abundance of fragmentary

detail is a weakness as well as a strength. A more selective approach and a focus on a few stories rather than a multitude would help readers keep the narrative thread. A more energetic editor might also have pruned some of the repetition which in places mars the book.

The Poland in which Ms Richie lives is stronger, safer, richer and happier than at any time in its history. Warsaw has been rebuilt and is a thriving metropolis—once again one of Europe's great cities. But the invisible mental scars are still raw. Poles find it hard to trust each other or outsiders, and many Poles feel that foreigners still lack any real understanding of Poland's wartime fate (or in some cases contrition for their countries' part in it). Reading Ms Richie's book may help non-Poles begin to understand the depth of those feelings. ■

François Mitterrand

The sphinx

Mitterrand: A Study in Ambiguity. By Philip Short. The Bodley Head; 688 pages; £30. To be published in America in April as "A Taste for Intrigue: The Multiple Lives of François Mitterrand" by Henry Holt; \$38

ON THE night of François Mitterrand's death in 1996, his successor as French president, Jacques Chirac, summed up the wily Socialist leader as the "reflection of his century". The son of a stationmaster from Angoulême, who was taken prisoner by the Germans during the second world war, Mitterrand rose to become a cabinet minister at the age of 30, and in 1981 the Fifth Republic's first Socialist president. He embodied many of the 20th century's struggles and contradictions. Mitterrand worked for the Vichy administration during the second world war, and the resistance. He flirted with the political right, before embracing socialism with zeal, and then austerity and liberalisation with reluctance. He denounced the all-powerful presidency created by Charles de Gaulle, only to exercise power himself in the manner of a republican monarch.

How did Mitterrand navigate such a brilliant, exasperating, snakelike path to the presidency, and re-election in 1988? In this thoroughly researched biography, Philip Short, a former Paris correspondent for the BBC, shows the answer to be a mix of breathless cunning and ruthless artistry. Mitterrand was certainly dogged: as a student, he became infatuated with a teen-aged Parisienne to whom he wrote 2,000 love letters. He was uncompromising too. As president, he would "never accept", he snapped, the idea of apologising for Vichy's crimes. The French were appalled ►►



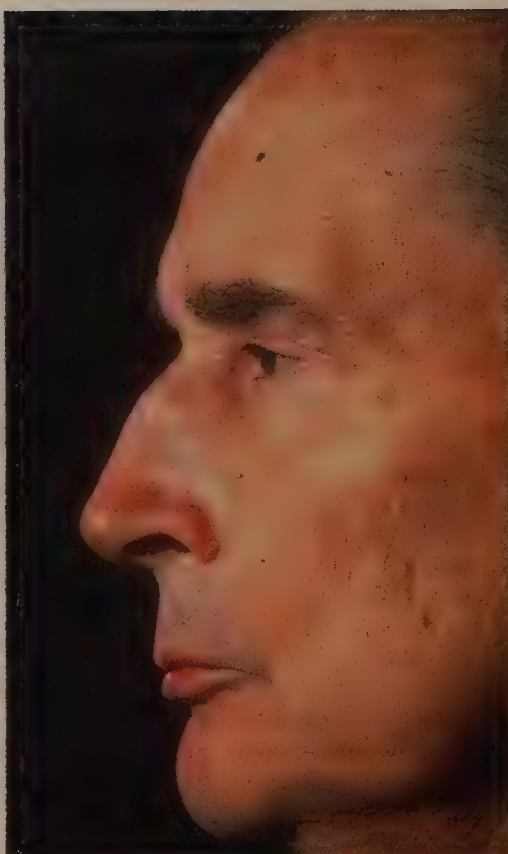
► to discover his lifelong friendship with René Bousquet, head of the Vichy police, exposed by Pierre Péan, a French investigative journalist. His 1994 landmark biography, "A French Youth", covered the period 1934 to 1947. Each year, Mr Péan went on to reveal, the Socialist president sent an official wreath to be laid at the tomb of the Vichy leader, Marshall Pétain.

Mitterrand was also deeply cynical, turning to socialism "less from conviction than from a process of elimination", writes Mr Short. His searing experience in a prisoner-of-war camp in Germany reawakened a sense of injustice at the arbitrary social hierarchies that had dominated his childhood in rural Catholic France. But the aspirant politician equivocated. "Politically, I'm really hesitating," he wrote to a friend in 1945: "I'd be quite willing to join the Socialists, but they are such old clots. The Communists are a pain and the others are all varlets and knaves."

Mitterrand was cultured and bookish, with a bewitching ability to charm; "he could have seduced a stone", wrote one French female journalist. But the president was also devious, intimidating, secretive and darkly manipulative, ever ready to break a pact and betray a confidence in pursuit of power and the exercise of it. His decision to appoint an ambitious Gaullist politician, Jacques Chirac, as prime minister in 1986, for instance, after being forced into cohabitation with the political right, was an attempt to "fatally weaken [Chirac], just as he had done earlier to the Communist Party".

Much of the political intrigue and scandal of this scholarly book will be familiar to students of the "Sphinx". Yet Mr Short has also delved into the state archives, as well as extracted confidences from Mitterrand's wife, Danielle, who died in 2011, and Anne Pingeot, his mistress, to produce some gems. In the corridors during a European summit, for instance, at which Helmut Kohl agreed to monetary union if Britain and France would accept German reunification, Mitterrand displays an obsessional fear about a unified Germany, telling Margaret Thatcher that it was like Munich in 1938.

Ambiguity reached deep into his private as well as political life. In the 1970s the Mitterrand couple lived together with their younger son and Danielle's lover, Jean Balenci, who would go out to fetch croissants in the morning for them all. "To outsiders," reports Mr Short, "he was introduced as a distant cousin." As president, Mitterrand would return after work at the Elysée Palace to Ms Pingeot and their daughter, Mazarine, whom he hid, like his cancer, from the general public and kept at the taxpayer's expense. "We did not set out to have separate lives," Danielle tells Mr Short. "Things happened." Mitterrand's personal behaviour, the author



He had a nose for the job

concludes, "was supremely egoistic".

The man who emerges from these pages is both brilliant and flawed. He utterly misread Mikhail Gorbachev and the end of the cold war and he was on the wrong side of history during the Rwandan genocide in 1994. He procrastinated to excess. He was above all a master of the art of political secrecy and survival, in an era when ambiguity was not subject to the sort of scrutiny that would expose it far more brutally today. ■

Chinese history

The empress strikes back

Empress Dowager Cixi: The Concubine Who Launched Modern China. By Jung Chang. Knopf; 464 pages; \$30. Jonathan Cape; £20

CHINA'S last real imperial ruler, the Empress Dowager Cixi, is a gripping subject for a biography. Born to a Manchu family fallen on tough times, Cixi became one of the emperor's low-grade concubines when she was just 16. In a fortuitous career move she was the only one to bear him a son before he died in 1861, 11 years into his rule. Cixi did not attend the coronation of her five-year-old; as a woman she was excluded from the main part of the Forbidden City. Cixi had no mandate to govern. Yet she overthrew the regents her husband appointed and became China's de facto ruler for most of the next 47 years.

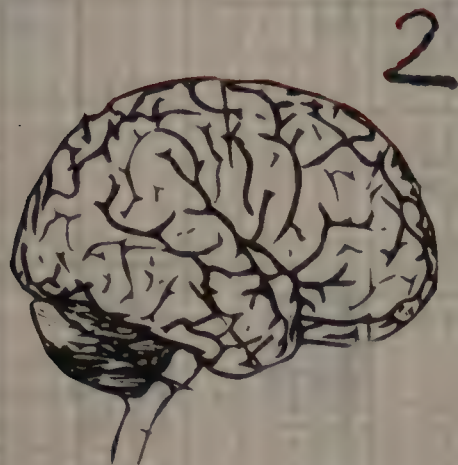
Three hours before she died the imperial matriarch was still at work.

The dowager empress presided over an extraordinary period in Chinese history. The imperial power was besieged from within by the bloody Taiping rebellion, a quasi-Christian group whose uprising killed 20m people over more than a decade, and a string of later insurrections. From without foreign powers were gradually encroaching onto Chinese soil. This was also an age of innovation: the country got its first telegraph, first pavements, first electric lights, a modern army and navy and a national flag.

Jung Chang is a vivid guide to these tumultuous decades, as readers of "Wild Swans", her prize-winning 1991 book, would expect. She has a novelist's eye for the telling detail: Cixi kept a skein of silk she had woven as a child to test against the quality of modern textiles; when she flees Beijing in 1900, she climbs onto the mulecart "as if it were the imperial throne". Ms Chang uses this skill to particular effect when illustrating the tensions which modernisation presented Cixi and the country. The empress could not bring herself to license a railway in 1875, for example, because it would mean disturbing the feng shui of ancestral tombs dotted across the country (cash was a bit tight too).

Many contemporary and historical representations of Cixi depict her as a brutal reactionary or sadistic nymphomaniac. Ms Chang's Cixi is a little too magnificent, a little too benevolent, to be believable. The reality is that on her deathbed she killed her adopted son with arsenic; short of carts to transport her fleeing entourage in 1900, she had the emperor's favourite concubine dragged along and thrown into a well. She presided over massacres in Xinjiang and closer to home. She was vain and at times corrupt, siphoning off money from the navy to rebuild her beloved Summer Palace. Ms Chang mentions these sins only in passing, becoming almost an apologist for Cixi's wrongs.

Three years after Cixi died, popular resistance swept away the Qing dynasty and ended several millennia of imperial rule. Embryonic nationalist movements bloomed in its wake and China began its long march to communism. Ms Chang implies that if Cixi had only hung on a little longer—or her legacy been respected—the country might have become a constitutional democracy. This seems optimistic. She was ultimately more interested in ritual than rights—her progressive political reforms were late in the day, undertaken as resistance to the dynasty intensified. Yet the dowager empress was certainly visionary, a shrewd strategist and often misunderstood. As a woman she ruled the country only in the name of her sons and made her decrees from behind a silk screen. It is fitting that she now be seen. ■



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Call for an international tender n°03/2013/IDA/PPCB/MEBF/DG/SG/DAF to for the conduct of 2 582 ha development works in Bagré (lots 1 and 2).

1. This call for tender is in tune with the General Procurement Notice posted online on April 13, 2012 on DgMarket.
2. Burkina Faso received a grant from the International Development Association (IDA) to finance the implementation of the Bagré Growth Pole Project (PPCB).
3. It intends to apply to a portion of the funds to eligible payments under the Contract relating the development of 2582 ha on the left bank of the Nakanbé in Bagré.
4. The overall timescale for completion shall not exceed eighteen (18) months for each lot.
5. Maison de l'Entreprise du Burkina Faso (MEBF) [Burkina Faso Business Centre] on behalf of Bagrépôle invites eligible and qualified bidders to submit their sealed tender for the development of 2582 ha in Bagré, organized in two (02) lots and including the completion of the works described below:

Lot 1: Reach F& G (surface area 1302 ha UAA)

- Construction of the reaches of the primary channel with reinforced concrete lining;
- Construction of a main path along the reaches of the primary channel on the right bank with crossing structures;
- Construction of a main path on the left bank of the primary channel with crossing structures;
- Construction of works associated to the primary channel reaches;
- Construction of main drainage collectors (natural outlets);
- Construction of the secondary irrigation network;
- Construction of the internal drainage network;
- Construction of internal paths.

Lot 2: Reach H&I (surface area 1280 ha UAA)

- Construction of the reaches of the primary channel with reinforced concrete lining;
- Construction of a main path along the reaches of the primary channel on the right bank with crossing structures;
- Construction of works associated to the primary channel reaches;
- Construction of main drainage collectors (natural outlets);
- Construction of the secondary irrigation network;
- Construction of the tertiary irrigation network;
- Construction of the internal drainage network;
- Construction of internal paths.

6. The procurement shall be conducted in accordance with the International Competitive Bidding (ICB) procedures specified in the "Guidelines for the award of public works contracts, public supply contracts and public service contracts (other than consultancy services) mandatory for use by the borrower from the World Bank and in accordance with the provisions of the January 2011 edition of the Guidelines: Procurement under IBRD Loans and IDA Grants and Credits". The bidding shall be open to tenderers from eligible countries as defined in the Guidelines.
7. Interested eligible Bidders may obtain further information from the Directorate General of la Maison de l'Entreprise du Burkina Faso, 132-Avenue de Lyon; phone : 50 39 80 60/61, Fax : 50 39 80 62, E-mail : dg@me.bf or from the Director of Infrastructure and Sustainable Resources of Bagrépôle at , 636 , Rue du Professeur Joseph KI ZERBO : 03 BP 7037 Ouagadougou 03, Phone : 50 32 40 28/49 ; Mail : info@bagrepole.com and consult the tender documents at the same address from 8:00 am to 12:30 pm and from 3.00 pm to 5.30 pm from Monday to Friday.
8. The qualification requirements for each lot are :
 - have an average annual turnover of fourteen billion (14 000 000 000) CFA FRANCS over the last five (05) years,
 - availability of a line of credit of at least one billion five hundred million (1 500 000 000) CFA,
 - Execution over the past five (05) years or from the date of creation if the company has less than 5 years , of at least two (02) contracts totaling a minimum of eight billion (8.000.000.000) FCFA each, in the following areas :
 - Construction of concrete-lined channels of at least 5 000 ml for water supply,
 - Development of irrigated perimeters of at least 500 ha surface area,
 - Installation of at least 2500 ml of PVC schedule 500 pipe and above,
 - Have the staff and material facilities as defined in the tender documents.
9. A margin of preference in favor national entrepreneurs/ enterprise groupings shall not apply.

Interested bidders may obtain the complete tendering dossier from the Accounting Department of la Maison de l'Entreprise du Burkina Faso 11 BP 379 OUAGADOUGOU 11, 132-Avenue de Lyon, Phone: 50 39 80 60/61, Fax: 50 39 80 62, Mail: dg@me.bf upon payment of a non-refundable fee of one hundred fifty thousand CFA francs (150.000 FCFA) or the equivalent amount in a freely convertible currency.

A preparatory meeting followed by a (non-mandatory) site visit will be held on December 13, 2013 from 9:00 UTC in Bagré.

10. Tenders should be submitted to the address indicated below no later than **January 07, 2014 at 9:00 UTC**. Electronic submissions shall not be accepted. Bids submitted after the deadline will be rejected. Submissions will be opened physically in the presence of bidders' representatives who choose to attend at the address indicated below on **January 7, 2014 at 9:05 am, UTC**.
11. All bids must be accompanied by a Bid Security in the amount of one hundred million (100.000.000)
12. The above mentioned address is as follows :

Direction Générale de la Maison de l'Entreprise du Burkina Faso (MEBF),
11 BP 379 OUAGADOUGOU 11, Avenue de Lyon
Phone: 50 39 80 60/61 – Fax: 50 39 80 62

14. Tenderers shall remain bound by their tenders for a period of one hundred and twenty (120) days from the closing date for receipt of tenders.

The Director-General

Issaka KARGOUGOU

Ouagadougou, November 11th, 2013

Economic data

% change on year ago

	Gross domestic product			Industrial production	Consumer prices		Unemployment rate, %	Current-account balance		Budget balance % of GDP	Interest rates, % 10-year gov't bonds, latest	Currency units, per \$	
	latest	qtr*	2013 [†]	latest	latest	2013 [†]		latest 12 months, \$bn	% of GDP 2013 [†]			Nov 27th	year ago
United States	+1.6 Q3	+2.8	+1.6	+3.2 Oct	+1.0 Oct	+1.5	7.3 Oct	-412.9 Q2	-2.5	-4.1	2.74	-	-
China	+7.8 Q3	+9.1	+7.7	+10.3 Oct	+3.2 Oct	+2.6	4.0 Q3 [‡]	+14.0 Q3	+1.9	-2.0	4.45 ^{§§}	6.09	6.22
Japan	+2.7 Q3	+1.9	+1.9	+5.1 Sep	+1.0 Sep	+0.3	4.0 Sep	+47.9 Sep	+1.2	-8.3	0.61	102	82.2
Britain	+1.5 Q3	+3.2	+1.4	+2.2 Sep	+2.2 Oct	+2.7	7.6 Aug ^{††}	-102.1 Q2	-3.4	-7.2	2.78	0.61	0.62
Canada	+1.4 Q2	+1.7	+1.7	+1.8 Aug	+0.7 Oct	+1.1	6.9 Oct	-59.6 Q2	-3.1	-2.7	2.55	1.06	0.99
Euro area	-0.4 Q3	+0.4	-0.4	+1.0 Sep	+0.7 Oct	+1.4	12.2 Sep	+251.1 Sep	+1.9	-3.0	1.71	0.74	0.77
Austria	+0.7 Q3	+2.5	+0.4	-0.1 Sep	+1.4 Oct	+2.1	4.9 Sep	+10.4 Q2	+2.6	-3.0	2.08	0.74	0.77
Belgium	+0.1 Q2	+1.0	nil	+0.4 Sep	+0.6 Oct	+1.3	8.9 Sep	-16.2 Jun	-0.9	-3.0	2.46	0.74	0.77
France	+0.2 Q3	-0.6	+0.1	-0.9 Sep	+0.6 Oct	+1.1	11.1 Sep	-47.0 Sep	-2.0	-4.1	2.25	0.74	0.77
Germany	+0.6 Q3	+1.3	+0.5	+0.9 Sep	+1.2 Oct	+1.6	6.9 Oct	+247.7 Sep	+6.7	+0.1	1.71	0.74	0.77
Greece	-3.0 Q3	na	-4.0	-1.8 Sep	-2.0 Oct	-0.8	27.3 Aug	+1.1 Sep	+0.1	-2.4	8.96	0.74	0.77
Italy	-1.9 Q3	-0.5	-1.8	-3.0 Sep	+0.8 Oct	+1.4	12.5 Sep	+13.4 Sep	+0.4	-3.3	4.07	0.74	0.77
Netherlands	-0.6 Q3	+0.3	-1.2	+0.5 Sep	+1.6 Oct	+2.7	8.5 Oct	+79.9 Q2	+9.9	-3.5	2.02	0.74	0.77
Spain	-1.2 Q3	+0.4	-1.3	+3.5 Sep	-0.1 Oct	+1.6	26.6 Sep	+8.3 Aug	+0.8	-7.1	4.17	0.74	0.77
Czech Republic	-1.3 Q2	-2.0	-0.7	+7.1 Sep	+0.9 Oct	+1.3	7.6 Oct [‡]	-3.8 Q2	-1.6	-2.9	2.29	20.1	19.6
Denmark	+0.6 Q2	+2.4	+0.3	+3.5 Sep	+0.7 Oct	+0.9	5.7 Sep	+21.2 Sep	+5.4	-2.5	1.77	5.49	5.77
Hungary	+1.7 Q3	+1.9	+0.4	+2.9 Sep	+0.9 Oct	+1.9	9.8 Oct ^{‡††}	+2.6 Q2	+1.4	-3.0	5.91	220	217
Norway	+2.1 Q3	+2.9	+1.7	+2.8 Sep	+2.4 Oct	+2.3	3.4 Sep ^{††}	+64.6 Q2	+13.2	+13.1	2.85	6.09	5.69
Poland	+1.9 Q3	na	+1.3	+4.4 Oct	+0.8 Oct	+1.0	13.0 Oct [‡]	-10.0 Sep	-2.1	-4.0	4.56	3.10	3.17
Russia	+1.2 Q3	na	+1.5	-0.2 Oct	+6.2 Oct	+6.4	5.5 Oct [‡]	+40.1 Q3	+2.6	-0.5	7.91	33.2	31.1
Sweden	+0.1 Q2	-0.9	+0.9	-0.9 Sep	-0.1 Oct	+0.2	7.3 Oct [‡]	+32.0 Q2	+6.4	-2.0	2.27	6.57	6.68
Switzerland	+1.9 Q3	+2.1	+1.7	-1.1 Q2	-0.3 Oct	-0.1	3.2 Oct	+76.6 Q2	+11.9	+0.2	1.01	0.91	0.93
Turkey	+4.4 Q2	na	+3.5	+6.4 Sep	+7.7 Oct	+7.6	9.8 Aug [‡]	-59.1 Sep	-7.4	-1.6	9.37	2.02	1.79
Australia	+2.6 Q2	+2.4	+2.5	+3.9 Q2	+2.2 Q3	+2.3	5.7 Oct	-49.4 Q2	-2.9	-2.1	4.11	1.10	0.96
Hong Kong	+2.9 Q3	+2.1	+3.0	+0.3 Q2	+4.3 Oct	+4.3	3.3 Oct ^{††}	+5.7 Q2	+3.6	+1.8	2.06	7.75	7.75
India	+4.4 Q2	-2.0	+4.9	+2.0 Sep	+10.1 Oct	+9.8	9.9 2012	-92.7 Q2	-4.0	-5.2	9.00	62.3	55.5
Indonesia	+5.6 Q3	na	+5.6	+5.6 Sep	+8.3 Oct	+7.1	6.3 Q3 [‡]	-32.1 Q3	-3.5	-3.3	na	11,885	9,600
Malaysia	+5.0 Q3	na	+4.5	+1.0 Sep	+2.8 Oct	+2.0	3.1 Sep [‡]	+14.2 Q3	+5.4	-4.3	4.05	3.23	3.05
Pakistan	+6.1 2013**	na	+6.1	+6.9 Aug	+9.1 Oct	+7.5	6.2 2013	-4.1 Q3	-1.0	-8.0	13.00 ^{†††}	108	96.2
Singapore	+5.8 Q3	+1.3	+3.5	+8.0 Oct	+2.0 Oct	+2.4	1.8 Q3	+49.8 Q3	+19.2	+0.7	2.31	1.25	1.22
South Korea	+3.3 Q3	+4.3	+2.7	-3.6 Sep	+0.7 Oct	+1.2	2.8 Oct [‡]	+68.1 Oct	+4.7	+0.7	3.63	1,061	1,084
Taiwan	+1.6 Q3	+0.4	+2.0	+0.8 Oct	+0.6 Oct	+0.9	4.2 Oct	+56.3 Q3	+11.8	-2.3	1.65	29.6	29.1
Thailand	+2.6 Q3	+5.2	+3.8	-2.9 Sep	+1.5 Oct	+2.2	0.8 Aug [‡]	-4.1 Q3	-0.3	-3.0	3.86	32.2	30.7
Argentina	+8.3 Q2	+10.6	+5.2	-0.1 Sep	— ***	—	6.8 Q3 [‡]	-1.7 Q2	-0.7	-3.2	na	6.11	4.82
Brazil	+3.3 Q2	+6.0	+2.5	+2.0 Sep	+5.8 Oct	+6.2	5.2 Oct [‡]	-82.2 Oct	-3.5	-3.0	12.75	2.31	2.08
Chile	+4.7 Q3	+5.4	+4.4	+2.9 Sep	+1.5 Oct	+1.8	5.7 Sep ^{††}	-9.5 Q3	-3.9	-1.0	5.06	526	480
Colombia	+4.2 Q2	+8.9	+4.0	-1.6 Sep	+1.8 Oct	+2.2	9.0 Sep [‡]	-12.9 Q2	-2.9	-0.6	6.72	1,928	1,824
Mexico	+1.3 Q3	+3.4	+1.2	-1.6 Sep	+3.4 Oct	+3.7	4.9 Oct	-24.9 Q3	-1.6	-2.6	7.75	13.1	13.0
Venezuela	+1.1 Q3	-0.8	+0.7	+0.5 Jun	+54.3 Oct	+40.9	7.8 Sep [‡]	+6.9 Q3	+0.7	-9.4	na	6.29	4.29
Egypt	+1.5 Q2	na	+2.1	-25.0 Sep	+10.5 Oct	+9.3	13.4 Q3 [‡]	-5.6 Q2	-2.3	-13.8	na	6.89	6.11
Israel	+2.4 Q3	+2.2	+3.0	-9.2 Sep	+1.8 Oct	+1.6	6.3 Q3	+4.9 Q2	+1.6	-3.5	3.57	3.54	3.86
Saudi Arabia	+5.1 2012	na	+3.7	na	+3.0 Oct	+3.7	5.5 2012	+137.0 Q2	+18.0	+6.0	na	3.75	3.75
South Africa	+1.8 Q3	+0.7	+1.9	-3.4 Sep	+5.5 Oct	+5.8	24.7 Q3 [‡]	-24.0 Q2	-7.0	-4.8	8.01	10.2	8.83

Source: Haver Analytics. *% change on previous quarter, annual rate. [†]The Economist poll or Economist Intelligence Unit estimate/forecast. [‡]Not seasonally adjusted. [§]New Series. ^{**}Year ending June. ^{††}Latest 3 months. ^{†††}3-month moving average. ^{§§}5-year yield ***Official number not reliable; The State Street PriceStats Inflation Index, October 18.99%; year ago 27.02% ^{†††}Dollar-denominated bonds.



Markets

	Index Nov 27th	% change on		
		one week	Dec 31st 2012 in local currency	in \$ terms
United States (DJIA)	16,097.3	+1.2	+22.8	+22.8
China (SSEA)	2,304.2	-0.3	-3.0	-0.8
Japan (Nikkei 225)	15,449.6	+2.5	+48.6	+25.9
Britain (FTSE 100)	6,649.5	-0.5	+12.7	+12.9
Canada (S&P TSX)	13,362.1	-0.5	+7.5	+1.1
Euro area (FTSE Euro 100)	1,010.4	+1.1	+18.0	+21.4
Euro area (EURO STOXX 50)	3,082.7	+1.2	+16.9	+20.4
Austria (ATX)	2,656.6	+1.9	+10.6	+13.9
Belgium (Bel 20)	2,869.8	+0.6	+15.9	+19.3
France (CAC 40)	4,293.1	+0.6	+17.9	+21.4
Germany (DAX)*	9,351.1	+1.6	+22.8	+26.5
Greece (Athex Comp)	1,175.8	+3.4	+29.5	+33.3
Italy (FTSE/MIB)	18,924.8	+1.0	+16.3	+19.7
Netherlands (AEX)	396.2	-0.1	+15.6	+19.0
Spain (Madrid SE)	997.9	+2.8	+21.0	+24.6
Czech Republic (PX)	1,026.1	+1.1	-1.2	-6.6
Denmark (OMXCX)	542.7	+0.5	+19.9	+23.5
Hungary (BUX)	18,508.1	+0.1	+1.8	+2.1
Norway (OSEAX)	591.0	-0.1	+20.5	+10.0
Poland (WIG)	54,678.7	-0.2	+15.2	+15.1
Russia (RTS, \$ terms)	1,404.3	-3.0	-0.1	-8.0
Sweden (OMXS30)	1,310.1	+1.2	+18.6	+17.4
Switzerland (SMI)	8,245.7	-0.4	+20.9	+21.8
Turkey (BIST)	74,896.0	-0.6	-4.2	-15.4
Australia (All Ord.)	5,324.8	+0.4	+14.2	-0.3
Hong Kong (Hang Seng)	23,806.4	+0.4	+5.1	+5.1
India (BSE)	20,420.3	-1.0	+5.1	-7.5
Indonesia (JSX)	4,251.5	-2.3	-1.5	-20.1
Malaysia (KLSE)	1,798.5	nil	+6.5	+0.8
Pakistan (KSE)	23,768.4	-0.1	+40.6	+26.3
Singapore (STI)	3,172.1	-0.4	+0.2	-2.5
South Korea (KOSPI)	2,028.8	+0.6	+1.6	+2.5
Taiwan (TWI)	8,295.9	+1.1	+7.7	+5.7
Thailand (SET)	1,373.1	-2.3	-1.4	-6.2
Argentina (MERV)	5,601.2	+4.5	+96.2	+58.0
Brazil (BVSP)	51,861.2	-2.2	-14.9	-24.7
Chile (IGPA)	18,306.9	-1.3	-13.1	-21.0
Colombia (IGBC)	13,114.5	-2.1	-10.9	-18.3
Mexico (IPC)	41,872.6	+2.6	-4.2	-4.9
Venezuela (IBC)	2,521,612.0	+17.0	+435	na
Egypt (Case 30)	6,205.4	-4.5	+13.6	+5.0
Israel (TA-100)	1,216.0	+0.2	+15.9	+22.3
Saudi Arabia (Tadawul)	8,300.7	-0.4	+22.0	+22.0
South Africa (JSE AS)	44,564.0	-1.4	+13.5	-5.7

Firms' listings and geographic sales

Less than a quarter of the sales of companies in Britain's FTSE 100 index are in Britain, according to Capital Group, an asset-management firm. Emerging markets and America account for 30% and 19% of sales, respectively. Germany's and France's main stockmarket indices show a similar phenomenon. Only seven companies in the FTSE 100 have "complete exposure" to the British economy, the firm says. That the world's biggest companies are increasingly global is unsurprising; and in the case of firms like Burberry, a luxury fashion brand, it testifies to their export success. But for investors seeking precise geographic exposure, it makes ever less sense to invest in their target country's main index.

Other markets

	Index Nov 27th	% change on		
		one week	Dec 31st 2012 in local currency	in \$ terms
United States (S&P 500)	1,807.2	+1.5	+26.7	+26.7
United States (NAScomp)	4,044.8	+3.1	+34.0	+34.0
China (SSEB, \$ terms)	250.1	-0.2	-0.1	+2.1
Japan (Topix)	1,247.1	+1.1	+45.0	+22.8
Europe (FTSEurofirst 300)	1,300.5	+0.2	+14.7	+18.1
World, dev'd (MSCI)	1,624.8	+0.8	+21.4	+21.4
Emerging markets (MSCI)	1,008.8	-1.1	-4.4	-4.4
World, all (MSCI)	400.8	+0.6	+18.0	+18.0
World bonds (Citigroup)	914.3	-0.2	-3.2	-3.2
EMBI+ (JPMorgan)	648.5	-0.3	-8.8	-8.8
Hedge funds (HFRX)	1,215.4 ³	+0.4	+5.8	+5.8
Volatility, US (VIX)	13.0	+13.4	+18.0 (levels)	
CDSs, Eur (iTRAXX) ¹	77.1	-4.4	-31.3	-29.3
CDSs, N Am (CDX) ¹	68.9	-7.4	-22.0	-22.0
Carbon trading (EU ETS) €	4.5	+0.9	-33.5	-31.5

Sources: Markit; Thomson Reuters. ¹Total return index.²Credit-default-swap spreads, basis points. ³Nov 26th.

Indicators for more countries and additional series, go to: Economist.com/indicators

Listed companies' sources of revenue*, Q2 2013
% of total

Country where listed

Sales elsewhere:



Source: Capital Group

*Latest full year

The Economist commodity-price index

2005=100

2005=100

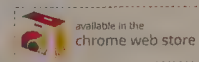
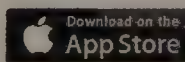
			% change on	
	Nov 19th	Nov 26th*	one month	one year
Dollar Index				
All Items	162.0	164.5	-0.6	-12.1
Food	179.4	183.5	+1.0	-15.8
Industrials				
All	143.8	144.7	-2.6	-6.7
Nfa ¹	157.2	157.6	nil	+0.4
Metals	138.0	139.2	-3.8	-9.8
Sterling Index				
All items	182.9	184.9	-1.3	-13.0
Euro Index				
All items	148.9	150.8	+1.0	-16.2
Gold				
\$ per oz	1,274.9	1,244.1	-7.6	-28.7
West Texas Intermediate				
\$ per barrel	93.4	93.8	-4.4	+7.5

Sources: Bloomberg; CME Group; Cotlook; Darmann & Curl; FT; ICCO; ICO; ISO; Jackson Rice; LME; NZ Wool Services; Thompson Lloyd & Ewart; Thomson Reuters; Urner Barry; WSJ. *Provisional
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Doris Lessing

Doris Lessing, writer, died on November 17th, aged 94

AS SHE climbed slowly out of the taxi with her shopping, her grey bun coming down as usual, Doris Lessing noticed that the front garden was full of photographers. They told her she had won the 2007 Nobel prize for literature. She said, "Oh, Christ." Then, picking up her bags, "One can get more excited." And then, having paid the cab man, "I suppose you want some uplifting remarks." She supplied a few later for her official Nobel interview, but still on her own terms: wearing what looked like a dressing gown and a lopsided, plunging camisole at a kitchen table overloaded with open packets of crackers and messy jars of jam.

For 30 years, by her reckoning, people had expected that she would get the prize. She hated expectation: that burden that made you a prisoner of circumstances and dragged you along like a fish on a line. The expectation when a child that she would behave, and not try to pull down her itchy stockings or burst into tears. The expectation that she would be a good wife (as she tried twice), pushing prams all day long, instead of leaving her two small children behind to start a new life. The expectation that the Communist revolution would usher in Utopia, when it was all "a load of old socks". Why did people expect such things? Who had promised them? When?

Most frustrating was the public's expectation that she, as a writer, would keep to one path. After the success of her first novel, "The Grass is Singing" (1950), packed in manuscript in her suitcase when she arrived, almost penniless, in Britain from Southern Rhodesia, she could have kept on writing about Africa. But in "The Golden Notebook" (1962) she plunged instead into the world of a woman's dreams and mental disintegration, to wide dismay. In "The Good Terrorist" (1985) she expanded on her theory that acts of terror could be blundered into, rather than ruthlessly planned: again, alarms and confusion. Her five-book "Canopus in Argos" series (1979-83) ventured into science fiction, chronicling moral and ecological disaster on a planet, Shikasta, that was Earth in thin disguise. Many of her fans thought she had gone bonkers. She insisted that it was the best writing she had ever done.

Her name for that, for it wasn't really science fiction, was "space fiction": suddenly the old literary constraints were lifted, and she could write with breadth about universal themes. It was like sliding out of a stuffy room (she always noticed smells, whether of animal hide, lice, peas, unwashedness) to thrust her nose into cool fresh air, or running out into the bush of her Rhodesian childhood, with its miles of

tawny grass shining in the sun. Or, in her London life, coming out of the flat where she had paced round and pecked at the typewriter all day to wander for hours through the night-time streets.

For too long she had played the game of being pleasant, fitting in. From childhood she was called "Tigger", the bouncy beast, the jolly good sport. Good old Tigger, who underneath it all was in a rage of hatred against her mother and aching to run away as, at 15, she did. Another persona was "the Hostess", so generous and talkative to the lefty and literary flotsam who crammed into her London flats, when inside she would be crushed from some unwise love affair or other, or just wanting to be alone. Everyone was a chameleon; hence "The Golden Notebook", in which a woman's life was narrated in discrete notebooks, emotional, political and everyday, which eventually tangled into one. Feminists seemed mostly to notice that it mentioned menstruation. They made it their handbook in the sex wars of the 1960s, which hadn't been her aim at all.

Myth and truth

A small part of her was feminist, just as a small part was Communist in the 1950s, and Sufi later. Every ideology collapsed into something else, just as her frail family farmhouse of mud and thatch would fade back into the bush in time. She never gave her whole self to anything, except to one lover, "Jack", in the 1960s—and to her third child, Peter, whom she cared for until he died, of diabetes, this year. As a writer she stood outside, "wool-gathering" and observing with sly eyes, like one of her cats. Much of her heart, though, lay in Africa, and her writing soared when recounting the labour of blacks, the easy bigotry of little-Englander whites (like her parents) and the sights and sounds of the place, from the smoke-mist of dawn to the rustling, creeping noise at night that revealed itself as rain. Rhodesia was her "myth country".

She wrote "The Grass is Singing" to expose a truth: that white women could desire black men. It made a shocking scene when Moses, the cook-boy, was seen through the window buttoning up Mary Turner's dress with "indulgent uxoriousness". And she could spring the hard truth in dozens of smaller touches: describing a new mother as "a sack of bruised flesh", or the "silky black beards" of underarm hair.

There was a true Doris, too, somewhere. This "aliveness" was where the stories came from, and it was buried deep. As she plumped herself wearily down on the doorstep to answer questions, that Nobel morning in 2007, she seemed to show an authentic, unbrushed side to the world's press. But the real Doris was saying, as she had every day for decades, Run away, you silly woman, take control, write. ■

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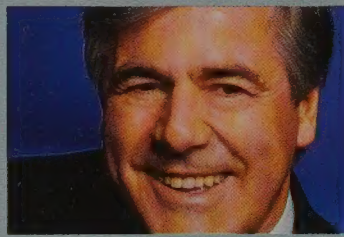
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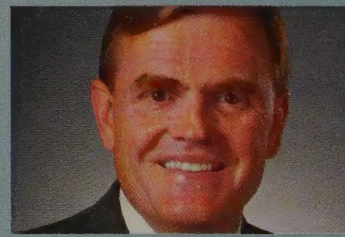
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